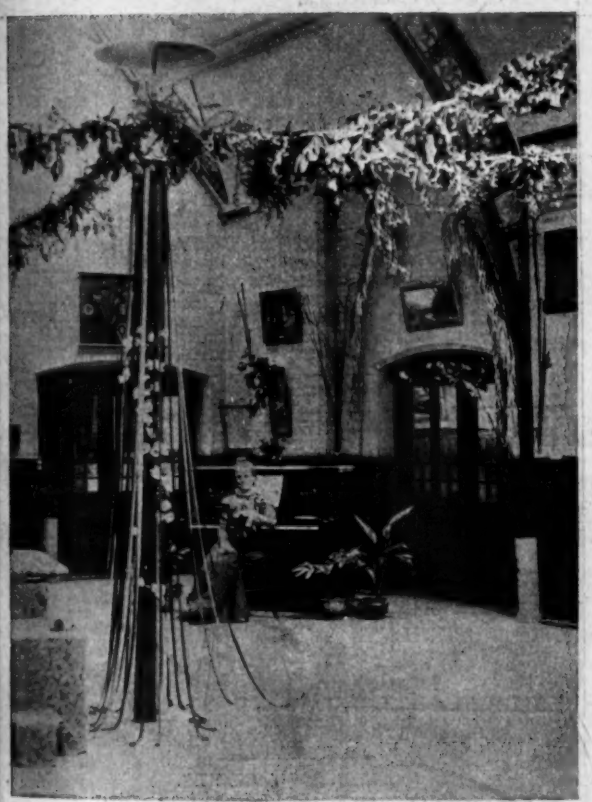
McVITIE & PRICE'S OATCAKES.

# THE PRACTICAL TEACHER



OUR MODEL INFANTS' SCHOOLS: MAY DAY IN THE HALL.

## CONTENTS
OF THE
## NOVEMBER NUMBER.


BY MANY HANDS .. 223
N.U.T. NOTES .. 225
NOTES FROM THE NORTH .. 226
WITH OUR CHILDREN .. 227
JENA AND ITS HOLIDAY COURSES .. 229
HOW TO MAKE A LANTERN SLIDE .. 231
COMMERCIAL EDUCATION. The Inaugural Congress of the International Association for the Development of Commercial Education .. 232
HIGHER COMMERCIAL EDUCATION .. 234
CURRENT NOTES ON THINGS IN GENERAL .. 235
NATURE-KNOWLEDGE. By James Knight, M.A., B.Sc. .. 237
STAR MYTHOLOGY FOR CHILDREN .. 238
GENERAL GEOMORPHOLOGY. By A. J. Herbertson, Ph.D. .. 239
A COURSE OF OBJECT LESSONS FOR SCHOOLS. By William Done, B.A. .. 241
HOW TO COMPILE NOTES OF LESSONS. By T. Hudson, Head-Master of Kepler Board School, Leeds .. 242
CRITICISM COMPETITION .. 243
THE INSPECTOR'S NOTEBOOK .. 243
ARITHMETIC TESTS .. 244
OUR MODEL INFANTS' SCHOOLS .. 248
A METHOD OF TEACHING NUMBER TO INFANTS. By C. M. A. Coombs, L.L.A. .. 252
PAPER-CUTTING AS A MEANS OF EXPRESSION .. 253
MUSICAL GAMES FOR INFANTS. Blue Birds and Yellow .. 257
OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE. By A. T. Flux .. 258
OUR CERTIFICATE COURSE FOR 1902. By G. Collar, B.Sc. 263
LONDON MATRICULATION. By C. J. Phillips, M.A. .. 266
OUR QUERY COLUMN .. 267
OUR FRENCH AND GERMAN PRIZE COMPETITION .. 270
MANUAL TRAINING AT THE ANTIPODES .. 271
PHYSIOGRAPHY .. 272
CHEMISTRY .. 273
ELECTRICITY AND MAGNETISM .. 274
NOTES ON ADVANCED HYGIENE .. 275
THE EDITOR'S TABLE .. 276



VOL. XXII No. 5

EDITORIAL, PUBLISHING AND ADVERTISING OFFICES OF "THE PRACTICAL TEACHER" 35 & 36 PATERNOSTER ROW, LONDON, E.C. NEW YORK OFFICE, 37 EAST EIGHTEENTH STREET.

PRICE 6D.


FRY'S PURE CONCENTRATED COCOA.

# CHAS. GRIFFIN & CO.'S LIST

Second Edition. In large 8vo, handsome cloth, 21s.

## PHOTOGRAPHY:

**Its History, Processes, Apparatus, and Materials.**

A Practical Manual. Comprising Working Details of all the More Important Methods. By A. Brothers, F.R.A.S. Including all the Newer Developments in Photographic Methods, together with Special Articles on Radiography (the X-Rays), Colour Photography, and many New Plates.

---

**NEW LANDS:** Their Resources and Prospective Advantages. A Handbook for Prospectors, Explorers, intending Emigrants, and Colonists. By Hugh Robert Mill, D.Sc., F.R.S., Librarian to the Royal Geographical Society. With Maps. Crown 8vo, handsome cloth, 5s.

---

**PRACTICAL GEOLOGY (AIDS IN).** With a Section on Palæontology. By Grenville A. J. Cole, M.R.I.A., F.G.S., Professor of Geology, Royal College of Science for Ireland. Third Edition. Cloth, 10s. 6d. Revised and in part Rewritten. With Illustrations and Coloured Frontispiece.

---

**A TEXT-BOOK OF PHYSICS.** Comprising Properties of Matter, Sound, Heat, Magnetism and Electricity, and Light.

Vol. I.—Properties of Matter. [*At Press.*

Vol. II.—Sound. By J. H. Poynting, Sc.D., F.R.S., and J. J. Thomson, M.A., F.R.S. Second Edition. Fully Illustrated. 8s. 6d.

---

**WELLS'S ENGINEERING DRAWING AND DESIGN.** By S. H. Wells, Wh.Sc., A.M.I.C.E., A.M.I.Mech.E., Principal and Head of the Engineering Department, Battersea Polytechnical Institute. In Two Parts, sold separately.

I.—Practical Geometry: Plane and Solid. 3s.

II.—Machine and Engine Drawing and Design. 4s. 6d.

Forming a complete course. With numerous Examples and Illustrations prepared expressly for the work.

---

### *Prof. JAMIESON'S POPULAR WORKS.*

**JAMIESON'S STEAM AND STEAM ENGINES.** With over 200 Illustrations, Folding Plates, and Examination Papers. Thirteenth Edition. Revised. 8s. 6d.

**JAMIESON'S ELEMENTARY MANUAL OF STEAM AND THE STEAM ENGINE.** Eighth Edition. 3s. 6d.

**JAMIESON'S MAGNETISM AND ELECTRICITY.** With 246 Illustrations and Examination Papers. Fifth Edition. 3s. 6d.

**JAMIESON'S APPLIED MECHANICS** (An Advanced Text-Book on).

Vol. I.—Comprising Part I.: The Principle of Work and its Applications; Part II.: Gearing. Third Edition. 7s. 6d.

Vol. II.—Comprising Parts III.–VI.: Motion; Energy; Graphic Statics; Strength of Materials; Hydraulics and Hydraulic Machinery. Second Edition. 8s. 6d.

**JAMIESON'S APPLIED MECHANICS** (Introductory Manual). Fourth Edition. Revised and Enlarged. 3s. 6d.

---

Just Out. Third Edition, Revised, Enlarged, and brought up to date. Containing all the latest Chemical Discoveries. 9s. net.

## A SHORT MANUAL OF INORGANIC CHEMISTRY.

By A. DUPRÉ, Ph.D., F.R.S., and WILSON HAKE, Ph.D., F.I.C., F.C.S., of the Westminster Hospital Medical School.

"A well-written, clear, and accurate elementary manual of inorganic chemistry.... We agree heartily with the system adopted by Drs. Dupré and Hake. Will make experimental work trebly interesting because intelligible."—*Saturday Review.*

---

### WORKS BY

### *Prof. A. HUMBOLDT SEXTON, F.C.S., etc.*

**QUANTITATIVE ANALYSIS.** Illustrated. Fourth Edition. Crown 8vo, cloth, 3s.

**QUALITATIVE ANALYSIS.** Illustrated. Third Edition. Crown 8vo, cloth, 3s. 6d.

**METALLURGY (AN ELEMENTARY TEXT-BOOK OF).** With numerous Illustrations. Second Edition. Revised. 6s.

---

**THE THRESHOLD OF SCIENCE.** Simple and Amusing Experiments. By C. R. Alder Wright, D.Sc., F.R.S., Lecturer on Chemistry and Physics, St. Mary's Hospital School. Second Edition, with numerous Illustrations. 6s. Presentation Edition, gilt edges, 7s. 6d.

---

**THE EARTH'S ATMOSPHERE.** Researches on its Past and Present History. Including the Latest Discoveries and their Practical Applications. By Dr. Thomas Lamb Phipson. Crown 8vo, handsome cloth, 2s. 6d.

---

Ready Next Month. Eighteenth Annual Issue. 7s. 6d.

**OFFICIAL YEAR-BOOK OF SCIENTIFIC AND LEARNED SOCIETIES OF GREAT BRITAIN AND IRELAND.** With Lists of the Papers read during 1900 before all the leading Literary, Scientific and Philosophical, Engineering and Architectural, Historical and Archæological, Legal and Medical Societies throughout the kingdom.

"One of the most generally useful works for the library or desk."—*Times.*

---

**London: CHARLES GRIFFIN & CO., Ltd., Exeter St., Strand.**

# Messrs. BELL'S NEW BOOKS.

***The completest and most accurate French Dictionary ever published at the price.***

New French Dictionary by F. E. A. Gasc.

**A CONCISE DICTIONARY OF THE FRENCH AND ENGLISH LANGUAGES.** By F. E. A. Gasc. Medium 16mo, treble columns, 3s. 6d.

---

### HANDBOOKS OF ENGLISH LITERATURE.

Edited by Prof. Hales.

NEW VOLUMES. Crown 8vo, 3s. 6d.

**THE AGE OF CHAUCER.** By F. J. Snell, M.A. With an Introduction by Prof. Hales.

---

Post 8vo, 7s. 6d.

**THEOCRITUS.** A New Edition, with Introduction and Notes, by R. J. Cholmeley, M.A.

"A new English edition of Theocritus has long been wanted....Mr. Cholmeley's elaborate edition is well worthy to fill the void, and is likely to be the standard edition among English students for many years."—*Educational Times.*

---

Crown 8vo, 3s. 6d. (Vols. I.–IV. ready; Vols. V. & VI. in the Press.)

**A HISTORY OF MODERN EUROPE.** From the Fall of Constantinople. By the late Thomas Henry Dyer, LL.D. A new edition, revised and continued to the end of the Nineteenth Century, by Arthur Hassall, M.A., Student of Christ Church, Oxford. In Six Volumes, crown 8vo, with Maps, 6s. net each.

---

In Five Parts, 8d. each.

**EXERCISES IN LATIN SYNTAX.** By L. D. Wainwright, M.A., Assistant Master at St. Paul's School.

Part I. **The "Ut" Book** (with Ne, Quominus, Quin).
Part II. **Conditional Sentences.**
Part III. **The "Cum" Book.**
Part IV. **Oratio Obliqua.**
Part V. **The "Qui" Book** (with Utinam, Quasi, etc.).

---

PART III. Now Ready.

**BELL'S LATIN COURSE FOR THE FIRST YEAR.** By E. C. Marchant, M.A., and J. G. Spencer, B.A. With numerous Illustrations. Crown 8vo, 1s. 6d.

---

## BELL'S ILLUSTRATED CLASSICS.

NEW VOLUMES.

### INTERMEDIATE SERIES.

**LIVY.** Book XXI. Edited, with Introduction and Notes, by F. E. A. Traves, M.A., Assistant Master at St. Paul's School. With numerous Illustrations and Maps. 2s. 6d. net.

**THE ATHENIANS IN SICILY.** Being Portions of Thucydides, Books VI. and VII. Edited, with Introduction and Notes, by the Rev. W. Cookworthy Compton, M.A., Head-Master of Dover College. With numerous Illustrations and Maps. 3s. 6d.

**HOMER'S ODYSSEY.** Book I. Edited, with Introduction and Notes, by E. C. Marchant, M.A., late Classical Master at St. Paul's School. With numerous Illustrations. 2s.

---

### ELEMENTARY SERIES.

With numerous Illustrations, with or without Vocabulary, 1s. 6d.

**HORACE: ODES.** Book IV. Edited by H. Latter, M.A., Assistant Master at Cheltenham College.

**CICERO: DE SENECTUTE.** Edited by A. S. Warman, B.A., Assistant Master at Manchester Grammar School.

**CICERO: DE AMICITIA.** Edited by H. J. L. J. Massé, M.A., Assistant Master at St. Paul's Preparatory School. [*Shortly.*

**VERGIL: AENEID.** Book V. Edited by J. T. Phillipson, M.A., Head-Master of Christ's College, Finchley.

GREEK PLAYS. 2s. each.

**EURIPIDES: HECUBA.** Edited by the Rev. A. W. Upcott, M.A., Head-Master of St. Edmund's School, Canterbury.

**EURIPIDES: MEDEA.** Edited by the Rev. T. Nicklin, M.A., Assistant Master at Rossall.

---

London: GEORGE BELL & SONS,
York Street, Covent Garden.

BRITISH MUSEUM

# THE PRACTICAL TEACHER

A MONTHLY MAGAZINE AND REVIEW FOR THE SCHOOL-ROOM AND THE STUDY

**Vol. XXII. No. 5. NOVEMBER, 1901. Price 6d.**



## NOTICES TO CORRESPONDENTS AND SUBSCRIBERS.

"The Practical Teacher" may be ordered of any Newsagent or Bookseller, or at any Bookstall in the United Kingdom or in the Colonies. Supplies are sent monthly to the chief towns in Australasia, South Africa, and India.

London Office: 35 and 36 Paternoster Row.
Edinburgh Office: Parkside Works.
New York Office: 37 East 18th Street.
Paris: Neal's Library, 248 Rue de Rivoli.
Berlin: Gsellíusische Buchhandlung, Mohren Strasse.

Subscribers may obtain "The Practical Teacher," post free, from the Publishers at the following terms:—

United Kingdom, Continent, Colonies, and United States } 12 Months, 8/- 6 Months, 4/-

All literary communications should be addressed to Henry Scheurmier, Office of "The Practical Teacher," 35 and 36 Paternoster Row, London, E.C.

Remittances, Cheques, Post-Office Orders, etc., should be made payable to Thomas Nelson and Sons. Advertisement rates on application.


# BY MANY HANDS.

***"Quot homines, tot sententiæ."***

FROM the recent experiments of Professor R. Dodge, it would appear that in discussing the relative merits of the *Look-and-Say* and the *Alphabetic* method of teaching reading, not only the nature of results achieved, but also the nature of vision, should be taken into account. In order truly to see any object at rest in the field of vision, the eye itself must remain motionless for an appreciable length of time. The fact that if the eyes move they are practically blind for about one-twentieth of a second, explains the necessity, in boxing, fencing, etc., of looking at a relatively fixed point, and also the secret of the success of those tricks of legerdemain in which, while watching the larger, slower movements of the hand, the more rapid movements of the fingers are absolutely unseen.

***The Psychology of Reading.***

Professor Dodge's more recent experiments have conclusively proved the accuracy of those he made some four years ago, when, in conjunction with Professor Erdmann, he demonstrated that the eyes do not move regularly over the page as we read, but rather make a series of rapid jerks and distinct pauses as they sweep along each line of print. It is only during the pauses that the eyes actually see the words; and from this it is obvious that it is the word, or rather a group of letters, and not the individual letter, which is the unit of stimulation. The application of this fact is equally obvious.

* * *

FEW have any idea of the enormous quantity of common salt, to say nothing of other solids in solution, that is contained in the waters of the ocean. According to Murray and other eminent authorities, the salt (sodium chloride) of the sea would cover the land area of the globe with a solid layer four hundred feet in thickness. The prevalent idea is that much of this must have been present from the first, when the waters "condensed out of the first atmosphere of gas and vapour that enveloped the earth. The saline vapours, which were no doubt diffused abundantly through that atmosphere, would be carried down in solution into the primeval ocean" (Geikie).

***The Salt of the Sea—***

Professor Joly, however, denies that "the sea was salt from the first;" maintaining, on the contrary, that the waters of the ocean were at first fresh, and that their present saltness is almost entirely due to dissolved matter poured into them by the rivers.

* * * * *

HERE, then, a very interesting calculation presents itself. The annual amount of solvent denudation may be taken as a measure of the age of the earth. The ratio between the total quantity of sodium chloride in the sea and the amount poured into it annually by the rivers will—assuming the primeval freshness of the ocean and a uniform rate of solution—give the duration of the earth since subaërial denudation began. Sodium is alone taken into consideration, because every other element supplied to the ocean in solution by the rivers is again rejected, in one way or another, to an extent which renders it unavailable for purposes of calculation. Making what he considers all due allowances for various sources of error, Professor Joly comes to the conclusion that ninety millions of years must have elapsed since the formation of the primeval fresh-water ocean. This period is considerably in excess of that calculated by the physical methods of Professor G. H. Darwin or of Lord Kelvin, but very considerably less than that claimed on biological grounds by Lyell, Haughton, and others. Even granting the validity of the adverse criticisms of Professor Sollas, it is not without cause that Professor Joly claims that, compared with his, no other method approaches the subject so directly, or on such easily obtained data.

***And the Age of the Earth.***

***Next Month:***

**ILLUSTRATED PRIZE-BOOK SUPPLEMENT,**

AND

**CONTRIBUTION BY MR. J. H. YOXALL, M.P.**

**Hysterical Mud-throwing.**

WE have become accustomed to the inveterate habit of a certain class of writers of making the English primary school the scapegoat on whose back can be bound the responsibility for all the national abuses and shortcomings. "Board School manners" and "Board School religion" are common phrases in the mouths and on the pens of these undeniably zealous but sadly misinformed *gratte-papiers*. Does the attendance on the services of the church fall off? at once the pernicious influence of Board School teaching is held up to reprobation. Should one of this brotherhood be elbowed in the city, or have his toes trodden on in an omnibus, instantly a fulminating article or paragraph on deportment, as understood in Board Schools, appears in the papers or magazines.

There is a grasshoppery logic in the inferences of these gentlemen that would be infinitely amusing, were the consequences of it not so disastrous. For the average reader doesn't stop to examine the validity of the argument, and is prone to accept the conclusion as proved. In fact, you can't throw mud without some of it sticking, especially if you throw plenty of it, and keep on throwing.

* * *

**Illogical Musings.**

THE writer in *Blackwood's* who muses without method on anarchy and the assassination of President M'Kinley, has either allowed this hop-skip-and-jump sort of logic to carry him further than he intended, or he does not wish to be taken seriously, in which case he has perpetrated a very bad joke. To speak of the people as "*the half-educated mob which the Board School turns out, ready for any villainy*," is to discount very heavily the value of his article in the eyes of sober-minded people. If to be half educated is a crime, what section of the population is free from the imputation of criminality? And if the isolated crime of any member of a class of society is a sufficient ground for condemnation of the education of that class, then the social history of the last century must lead one to condemn all education unsparingly.

We prefer to think that the writer in question intended to be facetious; the inference is too grossly fallacious for us to suppose that any public writer could be serious in making it. But such *plaisanteries* are really too dangerous. It is like playing with edged tools. Some one is bound to be cut before the game is over.

* * *

**Killed by an Abridgment.**

OUR contemporary, *The Journal of Education*, has an amusing "skit" on the German passion for lengthy and minutely detailed title-pages. The Herr Professor Doktor, who had written a monograph on Herbart, to be published by an American firm, is killed by the shock of receiving an author's copy with the legend "School," which brief superscription represents the American condensation of his own cherished title. Now the professor's title-page runs to twenty lines, with some fearsome-looking agglutinative nouns and adjectives. Hence the shock, and its dire results. The "skit" reminds us of the work of one of our own colleagues—a worthy German, since dead—who edited a small educational work for college use. When it appeared, the original work was represented by some fifty or sixty meagre pages; the notes filled more than two hundred, closely printed, and almost destitute of margin! The passion for thoroughness is essentially [illegible] but in the matter of title-pages and annotations we wish it were not quite so fervent.

* * *

**A Schoolboy's Letters.**

AN "Admiring Englishman" presents in that beautifully-produced and well-edited monthly *The Pall Mall Magazine* for October some specimens of an American schoolboy's letters. He thinks that in epistolary literature too little has been made of the schoolboy, while every other department of letter-writing has been so ruthlessly ransacked that writers are reduced to the miserable trick of dishing up fictitious letters anonymously. On the other hand, "it is unnecessary to invent the schoolboy; he is there." He is very much there, as many of us know to our cost. But he is an amusing little animal when properly handled, and, so far as his epistolary correspondence goes, he is refreshingly free from convention, being rather given to setting up his own original canons of literary style and artistic appreciation. The American youngster in question is no exception to the rule, and treats all subjects and his parents alike with a free-and-easy dignity that makes his efforts charming. His parents are evidently travelling in Europe when the correspondence opens. Here is an extract from his first letter:—

* * *

**On the Guillotine.**

"I AM glad you are having a good time over there and hope there will not be a storm when you come back. I read about all the places you told me, and would like to see the gullatin, it must have been very nice to have lived at that time as there is nothing going on now. I will like the picture very much of Napoleon when it comes if you can get it over safe but I think the french behaved very mean to him in the end. I hear the tea bell ringing and must get tidy for it

Your loving friend Roger B. Elmslie."

* * * * *

That reference to the "gullatin" is delightful. Young America rises at once to the possibilities of the instrument, and wails over the dullness of the present times: "There is nothing going on now." And doesn't the subscription, "your loving friend," breathe the very spirit of the republican equality which Yankee babies are supposed to imbibe with their mother's milk?

* * *

**With the Typewriter.**

A TYPEWRITER had been given to him as a present by his father, and, dutifully enough, the boy uses it in his correspondence, with quaint results in spelling and what he calls "spasing."

"DEAR MAMMA.

"This can only be a short letter as I have no more paper left as all the fellows will borrow it and I have got no money left to buy any more. thank you for the dict. I will try and look out all the words but it takes a long time when you are in a hurry. I dont wear my best suit on week days only on SUndays, and the housekeeper here who is also a very nice woman mended my pants on our birthdays she makes uS cakes and is very kind. WILL lost his best hat it fell into the water the other day when he went out to some ice that was not frozen hard the boys all pulled Will out but the hat went down. I am sorry you have been sick and will try and write oftener but last Sunday there was a fight going on.

BRITISH MUSEUM

"I wish we could get some skating but it is still too warm. I have only been away from Church once because I had a cold. thank Papa for the money I will try and make it spin out longer. Now I must stop because there ix no more room & hope you will think it neater this time.

Your loving friend Roger Elmslie."

THE use of the mechanical instrument doesn't change the frank brutality of the youngster's style, but an added piquancy is gained from the slips to which the budding typist is prone. His reason for not writing before is an exquisite example of the schoolboy way of estimating everything in a plump, downright fashion, putting all things on the same plane, quite discarding the *chiaroscuro* affected by the adult literary artist. Indeed, his last sentences to his father in his twelfth and last letter—"Tell papa I was glad to hear he won such a good score at golf this paper is not easy to write on and hope he will go on improving"—are the very quintessence of directness of handling. He knows how important it is for a father to be properly educated by his children, and, without any beating about the bush, offers up his ardent vows for the betterment of his male progenitor.

***A Chance for the Schoolboy.***

We think, with the "Admiring Englishman," that there is perhaps room for the *real* schoolboy—not the fictitious comic one—as a set-off to "Elusive Eliza," the "Nameless Englishwoman," *et hoc genus omne*. If his correspondence can be caught and preserved, for naturalness it will at once put in the shade these recent versions of *The Complete Letter-Writer*.

## N.U.T. NOTES.

THE ninety-four paged Blue Book containing the Report of the Board of Education is naturally full of interest for the educational enthusiast; and certainly not the least instructive of its contents are the pages dealing with Pensions and Superannuation. After stating that, under Article 130 of the Code, 1,553 aged teachers are receiving pensions (203 at £30, 631 at £25, and 719 at £20), the Report goes on to show the benefits derived from the Superannuation Act of 1898. Under its provisions, the following annuities and allowances are now in force:—

***Superannuation.***

| | | £ | s. | d. |
|---|---|---|---|---|
| Annuities from the Deferred Annuity Fund | 89 men | 28 | 16 | 10 |
| | 41 women | 8 | 7 | 4 |
| Superannuation Allowances | 197 men | 7,062 | 18 | 3 |
| | 93 women | 2,371 | 15 | 2 |
| Disablement Allowances | 115 men | 3,931 | 4 | 4 |
| | 209 women | 5,000 | 7 | 11 |

During the year ending March 31, 1901, disablement allowances under Section 2, amounting to £5,288, 9s. 1d., were awarded to 198 teachers, as shown in the following table:—

| | Men. | Women. | Total. |
|---|---|---|---|
| Between the ages of 30 and 40 | 6 | 23 | 29 |
| " " 40 and 50 | 14 | 39 | 53 |
| " " 50 and 60 | 33 | 55 | 88 |
| " " 60 and 65 | 12 | 16 | 28 |
| | 65 | 133 | 198 |

EVERY one remembers with gratitude the simply magnificent services rendered by Mr. T. B. Ellery, who has been described, not inaptly, as the "Apostle of Superannuation;" and I am delighted to note that a testimonial is to be presented to him next month by his many friends, known and unknown, all over the country. Countless Union workers have laboured with untold zeal and splendid devotion during the past thirty years without expectation of either fee or reward. Nevertheless it is most gratifying to see that, very occasionally, some tangible recognition of successful endeavours is ungrudgingly given. Mrs. Ellery is not to be forgotten on this happy occasion, and I heartily concur in the statement that "without her sympathy and support it would have been impossible for Mr. Ellery to have successfully completed his work." I trust that Mr. and Mrs. Ellery may both be long spared to cherish the sweet recollection of the esteem in which they are worthily held.

***And Mr. T. B. Ellery.***

WITH the possible exception of the members of His Majesty's Government, all thinking people are agreed as to the urgent necessity of an adequate supply of well-qualified teachers in the nation's schools. The many admirably-equipped pupil-teacher centres up and down the country are rendering a great national service by their efforts to elevate the intellectual standard of the teaching profession, although there still exists more than a hazy idea, in certain quarters, that the practical professional training is subordinated to the acquirement of the highest positions on the Scholarship list. Be this, however, as it may, it was a "happy thought" on the part of the Executive to arrange for a conference of a score of representative Instructors at Russell Square, and one result was undoubtedly to remove a good deal of misconception as to the attitude of the Union on the pupil teacher question. The president, Mr. J. F. Blacker, was in the chair throughout the day, and in a few well-chosen sentences welcomed the visitors, and expressed the hope that both they and the Executive would benefit from the day's deliberations. Exhaustive discussions ensued on (1) The Training of Pupil Teachers; (2) Scholarship Syllabus; (3) Science and Art Grants to Pupil-Teacher Classes; (4) Preliminary Examination for Pupil-Teacherships; (5) New Training College for London; (6) Age for Scholarship; but the only resolution submitted was the subjoined, which was unanimously agreed to:—

***P.-T. Instructors' Conference.***

"That, in the opinion of this Conference, the delay in issuing the King's Scholarship Syllabus for 1902 is causing great hindrance to the educational work of pupil teachers.

"The Conference also earnestly urges the Board of Education to issue in future the King's Scholarship Syllabus at least two years before the date of the examination."

WITH the greatest regret the news was received at the Executive's October meeting of the continued ill-health of Mr. E. L. Oliver, the vice-chairman of the Education Committee, and one of the representatives for the South London electoral district. Mr. Oliver has for many years past sacrificed both leisure and comfort—and possibly health in addition—through his altruistic zeal; and his labours on behalf of the

***Illness of Mr. E. L. Oliver.***

charitable funds of the Union, and as chairman of the M.B.T.A. Evening Continuation Schools Sub-Committee, will never be forgotten. Some three or four years ago I had the privilege of observing him on a deputation to the Education Department (as it was known then) on the evening schools question, when his fine grip of the subjects submitted and his ready wit struck me forcibly, although all the heavy artillery of the Executive were likewise present. That Mr. Oliver may speedily be restored to perfect health again is the ardent hope of his Executive colleagues and his legion of friends and admirers.

❧ ❧ ❧

**The Winter Campaign.**

ONE of the most important of the standing committees of the Executive to-day is the Parliamentary and Superannuation Committee; and under Mr. Waddington's chairmanship the parliamentary organisation connected with the N.U.T. has made a considerable stride towards completeness and perfection. On October 5, Mr. Waddington brought before the Executive a series of momentous recommendations from his committee, designed for the purpose of inaugurating an active campaign in favour of a thoroughly good Education Bill during the coming winter. Public meetings and negotiations and interviews of a private character have in the past been the main agents in any success achieved by the Union, but Mr. Waddington's great idea is educational *Conferences*. It is confidently hoped that members of the National Union of Teachers, technical instruction committees, trades councils, co-operative societies, school boards, and voluntary managers may all meet together in friendly conclave, and agree on a common line of action. That suggested by the Union will naturally be (*a*) one authority for primary (controlling Board and Voluntary schools), technical, and secondary education; (*b*) election of authority in accordance with the Yarmouth resolution; and (*c*) financing of schools (also the Yarmouth resolution). The consideration of the question occupied several hours, and Mr. Waddington's proposals were in the main agreed to. The Finance Committee now have the subject in hand, to deal with the vital matter of expense. Whether the Union's funds at the close of an exceptionally heavy year will carry an expenditure of some hundreds of pounds is a question which, for the moment, I cannot answer.

A. C.

## NOTES FROM THE NORTH.

**Class of Teachers contemplated.**

CIRCULAR 320, in connection with continuation classes, points out that, as the particular object of the Code is specialised instruction, the prime requisite of a teacher is real knowledge of the subject taught, rather than that acquaintance with educational aims and methods which forms a necessary part of the technical training of teachers of schools giving a general education. While, therefore, certificated teachers will prove the most suitable teachers for Division I., for the other divisions other and special qualifications will, as a rule, be necessary. These qualifications, it is pointed out, should, wherever possible, include a practical acquaintance with the business, occupation, or industry to which the class is relative, and, other things being equal, the instruction given will be all the better if that acquaintance is a present and living one. Experience has shown that it is not impossible for teachers or other persons, who from their previous training have become, as it were, examination experts, to pass theoretical examinations in subjects of a technical character while altogether destitute of any practical acquaintance with the related industry. It is evident that instruction by such persons will fall short in practical utility of that given by persons whose theoretical knowledge is corrected and supplemented by practical experience. For these reasons the Department contemplates the employment in continuation classes of a class of teachers distinct and separate from the regular teachers of schools, whether elementary or secondary, and only in exceptional cases should the two functions be combined. Theoretically, I think there is very little exception to be taken to these views, but practically there will be, I fear. It all depends on the little phrase, "other things being equal;" but unless there is to be a great difference on the class of pupils attending our evening schools, there will always be a felt need for *teachers* of experience. *The science and art of teaching* is being somewhat discounted by this latest edict of the Department.

❧ ❧ ❧

**Training Colleges.**

HAVING set the day schools in order by the Code of 1899, and the evening schools by the Code of 1901 and Circular 320, the Department has put its hand to the Training Colleges. By Circular 329, just issued, very great changes are to be introduced in that part of Scottish education. The separate examination at the end of the first year of training is to be discontinued, and courses of instruction best suited for the different classes of students are to be submitted by the authorities charged with the training of teachers.

In framing courses, regard is to be had to several considerations laid down by the Department. The students are to be divided into two main classes—(*a*) university students, and (*b*) non-university students—and a separate course for each class is to be submitted. The subjects of instruction likewise are to be dual—(1) those intended to secure a sufficiently high level of general culture on the part of the students; and (2) professional subjects. The work, too, is divided into two distinct periods, the winter session and the summer session.

Provision for the instruction of non-university students is to be made in the following subjects:—Group A, including physical exercises and drill, English, history, arithmetic, algebra and geometry, science and geography. Group B, including voice production and phonetics, drawing, singing, and needlework. Group C, the principles of education and school methods, and practice in teaching.

University students are to have their classes arranged by each college in one or more groups, to be taken by each student in a prescribed order of classes. English literature and natural philosophy are not to be taken earlier than the second year, and must be preceded by the first year's courses in these subjects under Group A.

❧ ❧ ❧

**What of Classics?**

AS will be seen from the groups of subjects, the Department has, so far as non-university students are concerned, decreed that a classical education is to go by the board. In the appendix to this circular the only mention of classics is under the head English, and it requires "an elementary study of Latin with a view to a better comprehension of English. This should comprise a study of the common Latin word-forms and constructions,

especially in their bearing upon the structure of English. It should be carried to such a point as to enable students to make out the meaning of easy passages from a Latin *delectus*." It seems to me that this division of students will lead to a differentiation of teachers—a differentiation which up to the present time has not taken place in Scotland. Will it not tend to lessen the general culture of many of our elementary teachers? Formerly, at Scottish training colleges, the great majority of all the male students took Latin and Greek. There will be two great classes of teachers, and School Boards will ask for non-university or university students according to their willingness to pay for their services.

Recognition as a "certificated teacher" is not to carry a qualification to teach a modern language, but an endorsement of such qualification may be made in respect of any language for which a student holds a Higher-Grade or Honours Leaving or equivalent Certificate.

Managers may provide supplementary exercises in household management (cookery and laundry work), woodwork or agriculture. Corresponding endorsement is to be made on the certificates.

THE September meeting of the Institute, favoured with very fine weather, was, if anything, more crowded than it has ever been—proving quite conclusively to my mind that the Royal High School is now too small for the annual gathering. There was no question of exciting interest, and I should not like to be in the hall if any such were on the *tapis*. It may have been that some were attracted by the fact that the Institute had conferred on Dr. Carnegie the degree of Honorary Fellow, and that he was expected to be present; while others, no doubt, were drawn thither by the large and up-to-date display of books and apparatus especially relating to the now much-discussed subject of free-arm drawing.

***The September Meeting.***

The president (Mr. Menzies, Kirriemuir), in reviewing the progress of educational events during the past year, dwelt at some length on the Carnegie gift, in which he thought we, as a profession, had a deep interest. For we have reason to believe that it will be the means of placing a university education within the reach of every young Scottish teacher who desires it; and in thus equipping teachers adequately for their work, it will be the means of raising their status, and of lending additional dignity to the profession. It would also, he believed, lead to another greatly-needed reform—the nationalisation of the training colleges and their affiliation to the universities, an event which would put an end to many anomalies, and be of great advantage to our system of national education.

HE next referred to the subject of secondary education. For some years we have had primary education free, and henceforth university education will be practically so. The question that naturally arises is, "How is the hiatus thus left between primary and university education to be filled? how is the gap to be bridged?" For bridged it must be, if the Carnegie gift is to have the full effect which its donor intended it to have. The simplest way, he thought, was to deal with secondary education as primary education was dealt with, and with one stroke of the legislative pen make it free. This would secure in our educational system that homogeneity which has been so long looked for.

***Secondary Education.***

Again, he would have the consolidation of all national funds destined for the support of primary and secondary education, and unification of control in the administration, there being theoretically no dividing line between primary and secondary education. He favoured the placing of them under one management—in the hands of one popularly-elected body, directly responsible to the ratepayers, and subject to the supervision of the Education Department. It is well to keep harping on this point, for it is only by such a solution that much confusion and waste will be stopped. The rest of his address was taken up with matters domestic, and which from month to month I have dealt with in these notes.

À *PROPOS* of the president's remarks on the Carnegie Trust, it is interesting to note that already more than five thousand applications have been made for payment of class fees. It was thought that there were many lads whose parents would decline to accept the benefits of the fund, because of their ability to pay the fees. This has not proved so as the result of the first year's experience. It seems as if the fee fund is being regarded by students and others as one from which all may unconditionally draw.

***The Carnegie Trust.***

Will this fund have any effect on the number of the students attending our training colleges? I believe already its influence is being felt in that direction. Many who could only obtain entrance to the profession through the aid of the Government bursary are seeing that they can do equally well by applying to the Carnegie Trust, so that there is likely to be a diminution in the number of students—both male and female, but especially the former—in our training colleges. The danger—and it is an increasing one—of many entering the teaching profession by the university only, and not having any practical acquaintance with teaching, will face us at no very distant date. Are the School Boards of Scotland going to appoint to their schools those who have gone through the university, and have never taught a class in their lives? Such are being appointed to-day, and it is a matter of serious moment to our education. R. G.

## WITH OUR CHILDREN.

THE last word has not yet been said regarding the ambidextrous training advocated by Mr. Tadd. That ambidexterity is not necessarily or normally combined with superior intelligence seems indicated by the statement recently made in an educational paper that children in a lunatic asylum are much more commonly ambidextrous than normal children are found to be. Now we have further light on this question, which seems to reveal a certain amount of danger connected with hand-training. Mr. Smedley, director of the Child-Study Department of the Chicago Board of Education, has found that a large number of left-handed children, who had been laboriously trained to use the right hand, are defective in speech.

***Ambi-dexterity—***

THIS, as is pointed out in a paragraph in *The Leisure Hour* for October dealing with Mr. Smedley's investigation, is in accordance with what is now known regarding localisation of function in the brain. The centre which controls speech is in close association with that

***And Brain Development.***

controlling the movements of the right hand, on the left hemisphere of the brain. But in the naturally left-handed, the right hemisphere seems to control speech as well as the movements of the left hand. When an attempt is made to train the right hand, involving exercise of the left hemisphere, it would seem as if the naturally superior side suffers, and a weakening of the power of speech follows. Where speech is so closely connected with written language, and sound with visual word-pictures, as they are among ourselves to-day, one might expect confusion to result from the substitution of one hand for the other in writing. But one would like to know more accurately what particular form of defect in speech is referred to in the case under discussion, and what special form of hand-exercise seems to have caused it. In the meantime, it may be well to note that though right-handedness may be purely artificial and conventional (which is, to say the least, very questionable), speech may be regarded as equally artificial and conventional, and that in certain circumstances interference with the one set of conventions may involve interference with the other.

THERE are two facts, or what seem to be established facts, which would lead to the conclusion that right-handedness is normal, and is in accordance with physiological law, and therefore ought not to be interfered with by educational processes. These facts we take on the authority of physiologists, and state in the inaccurate language of a layman. The first is, that on account of the position of the heart and of the arteries which supply the brain, the blood reaches the left hemisphere by a slightly *shorter road* than it does the right. This seems to point to a possibly considerable advantage to the left side in the supply of nerve-energy, which, of course, implies a corresponding advantage to the muscles of the right side of the body. The second fact, which is of the nature of a corollary from the first, has been but recently announced: the *temperature* of the left side of the head has been found to be distinctly above that of the right. It would be interesting to know how far these facts hold good of children who are naturally left-handed. In any case, they seem to afford a natural basis for our habit of normally training the right hand; and whatever training we may give to the left should not aim at demanding from it equal "dexterity" with that which nature has better endowed as to nerve-energy.

***Why we are Right-handed.***

IT is long since our Western civilisation reached a stage at which the exposing or otherwise terminating the life of sickly or delicate children became repugnant to the social conscience. We fell into the habit of allowing them to live, and of even encouraging them to do so. Handicapped at the start, the race was to many of them hopeless, and to all of them hard. Many noble efforts have been made, by homes, and hospitals, and benevolent associations, to reduce life's handicap to those little ones. The notable letter by Mrs. Humphrey Ward recently published in *The Times*, and supported by a sympathetic leader, marks another and an eminently sane attempt in the same direction. A child, we now recognise, has a claim upon us for life, including, as far as possible, that "preparation for complete living" which we call education. The crippled and maimed child has more need than others for such preparation, and is yet unable to reap the benefits of our common schools. The problem is, how to enable such children to receive an ordinary elementary education.

***Life's Handicap.***

IN order to enforce the appeal which she makes for voluntary helpers in such work, Mrs. Humphrey Ward very properly describes what has already been done for those children in London and elsewhere. It is a pathetic and yet an encouraging story she has to tell. We regret that space forbids our telling it here even in outline; but her letter is probably, in whole or in part, already familiar to readers of this journal. The school ambulance, with its nurse, conveying the children to and from school; the couches there for those who cannot sit up, or who require frequent rest; the school dinner, so potent a factor both of health and of education; the brightened childhood and the hopeful outlook for the future; the development of mind and of hand skill along with improving physique;—every detail is full of the deepest interest both to the philanthropist and the educationist. No wonder that Mrs. Burgwin can report, "As the benefits get known, we have had much difficulty in keeping our numbers within the limits of accommodation;" and she adds, "We are looking forward to some of them getting scholarships through the London County Council."

***Tempering the Wind.***

THE experiment has been tried of giving the children a more varied and nourishing diet than that which was at first adopted. The results, mental and physical, have been remarkable. "Partially paralysed children," says Mrs. Humphrey Ward, "have been recovering strength in hands and limbs with greater rapidity than before..... The effect, indeed, is startling to those who have watched the experiment. Meanwhile the teachers have entered in the log-book of the school their testimony to the increased power of work.....Hardly any child now wants to lie down during school hours, whereas applications to lie down used to be common; and the children both learn and remember better."

***A Noteworthy Experiment.***

LEAVING the philanthropic aspects of the question, which the writer's able advocacy will do much to advance, we should like to point the educational moral of all this. It is not too much to say that it is only in schools for children who are recognised as defective, either mentally or physically, that we find education upon a really scientific basis; and that basis can only be the nature of the child itself. There, traditional treatment and traditional curriculum must simply be thrown aside, and the whole scheme of school work must be adapted to the child as it is, and not as tradition assumes it to be. There, the child is found to be not pure intellect, but a human creature whose progress depends primarily on its body, and who benefits more by a nourishing dinner than by any "branch" of the tree of knowledge. We shall eventually learn much of the process of education and its conditions from those handicapped ones, and teachers will find that the care given to them "blesseth him who gives and him who takes." What Mrs. Humphrey Ward describes is not merely an experiment in treating weakly children; it is an experiment which will throw light on the education of all children. Such schools are child-study laboratories.

***A Moral.***

J. G.

# JENA AND ITS HOLIDAY COURSES.

BY A. E. STYLER,

*Modern Language Instructor at the Technical Institutes of Beckenham, Redhill, and Sutton (Surrey C.C.).*

## II.

### Special Didactics.

THE lectures on Special Didactics, by Herr Lehmensick, formerly master of the practising school under Dr. Rein, also aroused great interest. In connection with these lectures, lessons were given by Herr Landmann and Herr Lehmensick, in the presence of a great company of eager, critical teachers from all parts of the world. The stirring debates which followed were, in Dr. Rein's opinion, keener and fiercer this year than they had ever been. To me the whole course was full of engrossing interest. Herr Lehmensick's rapidly-delivered lectures, the serious little German schoolboys with their quaint accent, their wonderful facility of speech and keen emulation, the novel and striking methods employed, and the sturdy, stormy debaters who criticised them, the triumphs and the failures, the attack and defence—all combined to make the course as piquant as a tempestuous night in Parliament or at our Easter Conference.

The question which gave rise to the most fiery discussion was that of the so-called *Entwickelnd-darstellender Unterricht*. This is a method by which the subject-matter is gradually developed and related by the pupils, with the aid of suggestion from the teacher. The teacher does as little as possible, and the mental activity of the pupil is exercised to the utmost. For example, if the subject is a poem or a legend, the children relate the argument as if they had known it previously, although it may be quite new to them. The method requires immense skill and tact on the part of the teacher, and would at first be extremely difficult for the scholar, especially for the monosyllabic child found in some elementary schools. These German children had acquired a marvellous power of continuous narration, so much so that on the first occasion I thought they were reciting matter previously learned by rote. In the debate many critics objected that the subject-matter (*Nibelungensage*) was too well known to the children, so that there could be no *development*. A committee was therefore appointed to choose an absolutely new subject for a second lesson, which was subsequently given with great success by Herr Lehmensick. The subject was a tragic one—the story of Mattei Falcone, as embodied in Chamisso's beautiful poem. It is a dramatic tale of a Corsican boy who outrages the laws of hospitality by betraying a fugitive, and who is slain by his incensed father. The lesson was a triumph of pedagogic skill, and formed a splendid example of what can be accomplished by this method. According to English ideas, it was indeed too vivid and dramatic, and calculated to make the boys feel too deeply. English teachers who read German should procure Herr Lehmensick's work, *Wesen, Bedingungen, und Gefahren des entwickelnd-darstellenden Unterrichts* (*Bündner, Seminarblätter*, VII., 1 and 2). For foreigners this course afforded admirable though not easy practice in the German language. Herr Lehmensick has a sharp, rapid delivery, somewhat difficult to follow, and many of the debaters poured forth such a torrent of excited oratory that less advanced foreigners quite failed to follow them.

### Olla Podrida.

Of the six lectures by Dr. Just on the training of the moral character, I only heard the last, in which he spoke of the school journey, the school garden, workshop, and laboratory—that is, forms of school life in which work is the ruling principle; and of school games, religious observances, and festivals, which serve for recreation and moral improvement. Dr. Just speaks with such perfect distinctness that English visitors should certainly attend his lectures; for it is far more profitable to follow the courses which can be understood with little effort, than to waste energy in the attempt to understand careless or rapid speakers. This one lecture which I heard made me regret having missed the others.

I was unable to find time for the lectures on mentally deficient children and their treatment (Herr Trüper), and those on child psychology by Dr. Spitzner, but mention them here for the benefit of intending students who may be interested in these subjects. Herr Trüper is the director of an institution for backward and mentally defective children; and the fine building, beautifully situated on the Sophienhöhe, in the southern outskirts of the town, is well worth a visit.

During the second week free public lectures on educational subjects were delivered by various teachers who were attending the holiday courses. Professor Zimmer presided, and the whole series was valuable to the foreigner as practice in listening to spoken German, especially as the speakers came from different districts. One of the characteristics of the Jena courses is the superabundance of speech-making; but of the one hundred and forty Germans present there were a goodly number bent on making their mark as orators, and this is of great advantage to the Englishman whose ear is in need of exercise. He can be constantly listening to speeches, expressions of thanks to the lecturers, speeches during the excursions, speeches at the meetings of the Diakonie-verein, and speeches on the proposed formation of a pedagogical society, at which latter the rivalries of the various classes of teachers came to the surface and increased the flow of language considerably.

The language courses being by far the most important for me, I could only spare an occasional hour for theological and scientific lectures, and there were several professors in these sections whom I did not hear at all. The English student who visits Jena next year should choose carefully the subjects and lecturers that suit him best. An interesting subject and a distinct speaker are the two essentials for the language student. There is free admission to the first lecture of each course, so that it is easy to make a good choice. Some of the professors speak so rapidly and indistinctly that English students unaccustomed to spoken German would derive no benefit from their courses; while others, notably Dr. Rein and Dr. Just, can be perfectly understood by a foreigner who knows the written language and has learned a correct pronunciation.

I paid only one visit to Professor Anerbach's course on physics. He is a rapid but distinct speaker; and though the subject-matter was by no means easy, I was quite able to follow. He was discussing heat and temperature; and applying his algebraical formulæ to the question of the future of the universe, he deduced a comfortable modification of the usual dismal theory of the steady decrease of temperature, and the final universal reign of chilly death. He regards this decrease of temperature as continually going on, but ever more and more slowly; so that we need not consider it as proceeding at a constant rate to the final issue of universal death, but rather as a change that will creep on *ad infinitum*.

The lectures on geology pleased me very much. Professor Walther spares no pains. He comes into the lecture-room armed with a supply of photographs and specimens, trophies of his geological journeys, and he contrives to make his subject not merely interesting but fascinating. On the occasion of my first visit, he was describing the Ural Mountains as an old ruined mountain chain, worn down by denudation, and alluded to the international company of scientists with whom he had travelled in that region. He showed by means of diagrams how the Urals lay bare the oldest strata, yielding up in their metals and jewels the products of earth's inmost laboratory. On the second occasion Professor Walther was discoursing on the idea of geological time—the difficulty of historical chronology; the ancient civilisations of China and Egypt; and, finally, the Pyramids and geological strata. He concluded with a striking parallel between the two vast ideas of geological and astronomical time, those two grand impressions that thrill us when we gaze at the superposed strata of "scarped cliff and quarried stone," or at the sublime spectacle of the starry heavens. In the one case each stratum tells of a bygone age, more and more remote the

deeper we descend; in the other, the twinkling points send to our retina light-waves that set out on their flight across space it may be five years, or five centuries, or five millenniums ago.

### The German Language.

The language courses must be dealt with in my next paper, so that it will suffice to say here that the elementary course, which was conducted by Herr Lehmensick and Herr Landmann, was most practical and helpful. The direct method was employed throughout, both in the lessons and during the excursions which were carefully planned in connection therewith. In fact, these walks were more systematically organised than any I have ever taken part in at holiday courses. Between the elementary and the advanced course there was much too wide a step. The one appeared to me too simple, and the other abstruse, over-subtle, unpractical. Mere beginners should never attend foreign language courses, unless they wish to waste time and money. They always seem to progress more slowly in the foreign country than when under proper tuition at home. I remember living a whole month in a German pension with a young Frenchman who never got beyond *ein wenig* all the time I was there. These two words formed his entire stock-in-trade, and he blurted them out in answer to every question. Similarly, in Jena, there was a beginner who said nothing the whole time except *Ich versteh'!* Students should come well prepared, and then the elementary course need not be absolutely rudimentary. On the other hand, it does not seem expedient to trouble foreigners with the abstract philosophy of language, or with subtle, hair-splitting distinctions upon which even Germans are at variance. It is well to help the foreign student to acquire some sense of what is right and fitting in the language studied, but not to waste time upon debatable rules as to the use of *herab* and *herunter*. The German is proverbially fond of a long introduction, but Dr. Bruinier's introduction was so long that it was not until the fifth of his six lectures on *Allgemeine deutsche Syntax* that he reached the question of how perceptions may become feelings, and how feelings may be expressed in various ways, of which speech is one. The subtle philosophising of the preceding lectures was very able and very interesting, but *cui bono?* it is not what the practical foreigner requires. It was a real pleasure to hear Dr. Bruinier expound the doctrine of the *Kausalzusammenhang, über alle Zeiten und Räume reichend, den Zufall ausschliessend;* but from the standpoint of the language student who wishes to improve his mastery of German, this course was wide of the mark, and compared unfavourably with what I had seen elsewhere. There should, I think, be fewer abstract discourses and more conversational exercises illustrated by pictures.

### Pleasant Memories.

But I am forgetting what is perhaps after all the most important feature of life at holiday courses—the merry excursion in town and mountain and forest, the sudden friendships that spring up between congenial minds drifted together from the uttermost parts of the earth, the talks with interesting personalities that have developed in widely different environments. What a crowd of pleasant recollections one brings back from Jena! There were that long walk up to the Hausberg and the Fuchsthurm, the pleasant chat in French with the barrister from Belgium and the little *Lehrerin* from South Germany, the jovial time at the funny little inn on the hill-top, with the usual copious supply of "Bier und Tabaksdunst," and unrestrained mirth and jollity. A lady from Bremen came to the front as a comic singer and reciter, and the ever-gay, ever-loquacious Luxemburger sang a song in praise of his little state, which, by the way, he usually coupled with England as one of the Great Powers. Then in the twilight we descended the steep path through the woods, with the myriad lights of Jena glimmering through the foliage from the dark valley below.

One day I had a conversation with a Japanese student, who was taking the theological course, "Religious Tendencies of the Present Day." He had travelled in England in order to study our philanthropic and charitable institutions, and like so many of his nation, seemed remarkably quick, observant, and receptive. I asked him what he thought of Christianity, and he gave a very suggestive answer: "I think it a very *useful* religion." In the Burgkeller, I was conversing one evening with a Slav and an Italian, and happened to praise the Germans as good-natured people (*gemütliche Leute*). "Yes," said the Slav, "inland they may be *gemütlich;* but on the frontiers, in their dealings with Slavonic and Romance peoples, they show their teeth!" And so we gain insight into the racial feelings and rivalries of the nations.

We bring back memories of open-air coffee, and unlimited chatter with Germans in the shady gardens, when the ladies of the party produce an enormous *Dute* full of all kinds of confectionery, of which we must partake heartily for politeness' sake, even though we abhor sweet stuff, and prefer bitter ale. We smile as we think of the side-splitting laughter over the drawings and verses in a collection of students' books in a *Weinstube;* or we recall the long walk home from an excursion through a beautiful silent valley, with the Brunswicker on one side, and a sad-eyed Armenian girl from the Caucasus on the other. The Brunswicker, with his usual fluency and amiability, talks of German literature, of *Eulenspiegelei* and Goethe's *Reinecke Fuchs;* he explains why Germans are so fond of oak twigs and oak garlands, and why on German Easter cards we always see a hare. The Armenian girl tells us of the pathless mountains of her home land, the mixed population of Tiflis with its Asiatic and European quarters, the half-savage state of the frontier districts, and the robber bands that still infest this border-land of civilisation. We picture again the pleasant social evening in the Deutsches Haus—the laughable German play, the grave professors whirling in the giddy waltz and casting *Pädagogik* to the winds, the sweet trios by German girls and part songs by bearded Bavarians, the *Plattdeutsch* recitation by my Brunswick friend, and the whimsical dances, of which each nationality gives its own characteristic rendering. But the pleasantest memory of all is to me the excursion to Schwartzburg. We left the train at Blankenburg, where we saw the Froebel monument, and listened to an elderly lady who gave us a sketch of Froebel's career. Then we tramped on and on up the lovely Schwarzethal, higher and higher through magnificent pines and beeches, the idyllic surroundings bringing a romantic *Stimmung* that transformed many a prosaic pedagogue into a poet.

> "Many are the poets who have never penned
> Their inspiration, and perchance the best:
> They felt, and loved, and died, but would not lend
> Their thoughts to meaner beings."

We reached a forest glade, and sat down together on the steep slope, the stream softly murmuring far below, and the sunlight glinting through the beech leaves far above. One of our number, a *studiosus theologiæ* maybe, gave us a short sermon which sounded almost like a poem, and then we sang a slow German chorale. On again until we came to the Schweizerhaus, a forest inn, where we made a furious onslaught on the cool *helles Bier*, and rested for a while. The end of the long climb was the famous Trippstein with its unique view down the abrupt escarpment on to the village of Schwarzburg and the Schloss. We dined in the Thüringer Hof, where Dr. Rein made a speech on the holiday courses, and the *Streitbare Männer* of the pedagogic debates. We took coffee in the Hotel Zum weissen Hirsch, whence we had a view of a typical German scene, abrupt heights darkly wooded, sombre thunder-clouds and bright rainbow, and the Schloss perched high on a summit. Then came the long walk back to Blankenburg; and we find that we have tramped twenty-five kilometres without fatigue.

I have given a somewhat detailed account of this excursion, as illustrating what is perhaps the highest form of holiday enjoyment. We walk softly through the beech forest as in a solemn temple—the smooth boles are more beautiful than the clustered columns of a Gothic cathedral—we gaze up the steep *Halde* through the glint and rustle of the sunlit leaves, and feel that shuddering, sensuous thrill that only comes when beautiful nature, or beautiful music, or beautiful thought overpowers us. If our companion chances to be a kindred spirit, we at once talk together

on lofty themes which at home in England we should avoid through shy reserve, even with our dearest friends. That has been my happy experience in many of earth's pleasant places, in the forests of Thüringen, on the blue waters of Lake Leman, or under the shadow of Mont Blanc, and oftener in intercourse with foreigners than with my own countrymen. It is as though the foreign speech and foreign surroundings enabled the self-contained Englishman to break through his case-hardened reserve and utter his inmost thoughts; and that, perhaps, is the greatest charm of foreign holiday courses.

## HOW TO MAKE A LANTERN SLIDE.

BY A PRACTICAL TEACHER.

THE manufacture of lantern slides is undoubtedly one of the most fascinating processes in the whole range of photography, and one which will afford abundant employment during the long winter evenings. If the amateur has carefully pursued in practice the suggestions we offered in the last two issues of this magazine, he should be in possession of a series of negatives eminently suitable for this particular method of printing. Let us commence work.

The first essential is a supply of lantern plates, which may be purchased, in boxes containing a dozen, for 1s. There are many varieties, of excellent manufacture, on the market, any of which will be found perfectly reliable. As examples we may mention Imperial, Ilford Special, Cadett, Thomas's, Edwards's, Paget Prize, and Sandell plates. We would strongly urge the photographer to select one of these brands, to carefully master its manipulation, and adopt it to the exclusion of all others. We greatly regret that, owing to the scant appreciation it received, Dr. Hill-Norris's magnificent dry collodion plate is no longer obtainable, but we can confidently recommend any of the above.

The ordinary tourist generally employs a half-plate or a quarter-plate camera, the latter being the more popular on account of its compactness and consequent portability. From the half-plate negative slides are best made by "reduction," and from the quarter-plate by "contact."

1. **Reduction.**—The applicability of this term is obvious when it is remembered that from a negative $6\frac{1}{2} \times 4\frac{3}{4}$ inches a positive is to be made on a film $3\frac{1}{4} \times 3\frac{1}{4}$ inches. Many adaptations have been invented whereby the ordinary camera may be utilised in this work, but they are all more or less cumbersome, and liable to failure. We strongly advise the employment of Griffith's Patent Fixed Focus Lantern-Slide Reducing Camera, which possesses the twin advantages of perfection in operation and smallness of cost. The *oblong* variety, which permits of the reproduction of the whole of the picture, may be purchased from any respectable dealer for 14s. 6d. We have had one in use for upwards of ten years, during which period we have made scores of lantern slides by its aid, for many of which prizes have been gained in open competitions. At one end are two grooves, into the lower of which we slide the negative with the film turned towards the lens, which is fixed in a diaphragm in the centre of the camera. In the upper groove a sheet of ground glass may be placed if the negative is *very* thin or the light exceptionally glaring, but we have never yet found it necessary to use this light-filter. At the other end is a square flange, on which the lantern plate is lodged with its film towards the lens, the plate being secured in position by means of a steel spring. This end is then rendered "light-tight" by two lids of stout covered board. The camera, having been charged in the dark room, is advisedly carried into the open air, and the end containing the negative directed skywards—but *not* to the sun—for twenty seconds or more, according to the density of the image and the intensity of the light. The lantern plate is then ready for development.

2. **Contact.**—This method is commonly adopted in making slides from quarter-plate negatives, as the whole process can be performed indoors by artificial light. It is well to remember that most lantern plates are less sensitive than the very rapid negative plates so much in vogue, and hence there is no need for the operator to grovel in semi-darkness, as is so frequently done. For this work we have cut out an oblong frame of cardboard (which slides into the front of our dark-room lamp), and gummed a sheet of "canary medium" on each side. This fabric transmits an abundance of perfectly safe non-actinic light, which not only enables us to work in comfort, but is of incalculable service in helping us to determine when correct density is obtained in the process of development. The negative is placed film upwards in an ordinary quarter-plate printing-frame, and the lantern plate is then placed film downwards in contact with that portion of the image which we desire to print. The back is fixed in the frame by the springs, as usual, and we can then proceed to make the exposure. It will be well to follow carefully the instructions given by the manufacturer of the plate on this matter, as the emulsions with which the various brands are coated differ considerably in speed. An average time for a negative of ordinary density is about twenty seconds, with the frame held at a distance of eighteen inches from a naked bat's-wing gas burner. If the negative is thin, it should receive the same exposure, but at a greater distance from the source of light; if it is dense, it should still receive the same exposure, but at a shorter distance from the gas flame.

We will now briefly consider the all-important subject of development. We might offer a dozen different formulæ, each of which would yield excellent results with some particular make of plate, but we think it preferable to submit two which an experience of many years has proved to be equally suitable for any lantern plate in ordinary use.

1. HYDROKINONE DEVELOPER.

A.

| | |
|---|---|
| Hydrokinone | 80 grains. |
| Sodium sulphite | 1 ounce. |
| Potassium bromide | 15 grains. |
| Water | 10 ounces (half a pint). |

B.

| | |
|---|---|
| Caustic soda (stick) | 50 grains. |
| Water | 10 ounces. |

To make solution A, the sodium sulphite should first be dissolved in half a pint of boiling water, and the hydrokinone and potassium bromide added afterwards. The two solutions, A and B, will remain for a considerable time in excellent condition if preserved in stoppered bottles. For development, use half an ounce (fluid) of A with the same quantity of B. This developer has one decided advantage, that it may be used several times in succession—in fact, until it becomes discoloured. With a single ounce we have frequently developed four or five plates with perfect success. A hydrokinone developer will produce a rich, velvety-black tone on lantern plates which have received a normal exposure.

2. PYROGALLIC ACID DEVELOPER.

A.

| | |
|---|---|
| Pyrogallic acid | 20 grains. |
| Ammonium bromide | 20 grains. |
| Potassium metabisulphite | 60 grains. |
| Water (distilled or boiled) | 10 ounces. |

B.

| | |
|---|---|
| Liquid ammonia ·880 | 1 drachm. |
| Water | 10 ounces. |

To make solution A, first dissolve the metabisuphite and bromide and then the "pyro." To develop a lantern plate, use half an ounce of A, to which has been added an equal quantity of B. A fresh ounce will be required for each plate, as this mixture speedily discolours. This developer will yield a variety of pleasing, rich, warm tones on lantern plates which have received an exposure about half as long again as that required for hydrokinone treatment. The gravest difficulty to the beginner is to determine *how far* to carry this process of development. If it be insufficient,

the resultant slide will be thin and weak; if in excess, the slide will be dense, and the shadows almost opaque. But experience will soon teach the operator to find the required mean. We would advise him to carefully examine some thoroughly good slides, such as may often be seen in an optician's window; or, better, to borrow and study a few made by an expert. As the image has to be projected on the screen, density must be judged by transmitted, not reflected, light. Hence the plate should be taken from the developing dish and held by the edges close to the dark-room lamp, and as soon as the image appears slightly heavier than is desired in the finished slide, it should be transferred to the fixing bath.

When the plate is dry, we have but to mask and bind it in order to prepare it for use in the lantern. Excellent masks with variously-shaped openings may be purchased at the rate of about 1s. per hundred. It is necessary to inform the dealer whether they are required for slides made by reduction or contact, as the interior measurements are not the same in every case. The neatest and most durable slides in our collection have been finished by aid of Butcher's Combined Lantern-Slide Cover Glass and Spot Binder, an ingenious and ever-reliable article sold

MARBLE GROUP IN BERNE CATHEDRAL.

at 1s. a dozen. A similar device, more recently introduced, is Tylar's Linen-bound Lantern Cover Glass, sold at 1s. 3d. a dozen. The cover glass, having been carefully cleaned with a silk handkerchief on both sides, is placed face downwards on a table, and on it is fitted a mask which is considered most suitable to the composition of the picture. On this is laid the film side of the lantern plate, and the gummed strips, having been moistened by aid of a wet camel-hair brush (and advisedly left for a few seconds in order to render the paper limp and pliable), are pressed firmly round the edges with a soft duster, special attention being paid to the corners. By this means a slide can be finished in a few minutes, which is certainly not the case when the ordinary cover glasses and binding strips are used. Moreover, the strips attached are already "spotted," and have a white space left on which the title of the slide may be written.

Before concluding, perhaps we may be permitted to suggest a simple method of treating a slide on which is printed a group of statuary in marble, which materially adds to its effectiveness. Previous to mounting, the whole of that portion of the film on which is anything but the group itself is painted over with some opaque colour, a very fine brush being used in working round the outline of the figures. When seen on the sheet, the statue appears to stand out in relief in a manner that is most charming. Figure studies of fisher-folk, etc., treated in this way, produce beautiful slides. As an example, we would direct attention to a slide of Tscharner's masterpiece, "The Entombment," in Berne Cathedral, which we reproduce. The background of granite and light-coloured stone has been blocked out, thus effecting a strong contrast between the pure white marble and its black setting. We are but putting into practice one of the first principles of *chiaroscuro*, which will be readily recognised by a student of art. Much more might be written on this fascinating branch of photography, but we trust we have in the limited space at our disposal given such explicit and simple directions as shall enable even the veriest tyro to make an effective lantern slide.

## COMMERCIAL EDUCATION.

### THE INAUGURAL CONGRESS OF THE INTERNATIONAL ASSOCIATION FOR THE DEVELOPMENT OF COMMERCIAL EDUCATION.

BY A FOREIGN CORRESPONDENT.

THE Inaugural Congress of the International Association for the Development of Commercial Education was held at Zurich, from the 11th to the 13th of July. Before giving a brief account of the large and extensive programme, and the various and interesting subjects discussed at the congress, a reference to the newly-founded International Association is necessary.

Six international congresses on commercial education have already been held—namely, Bordeaux, 1886; Paris, 1889; London, 1897; Antwerp, 1898; Venice, 1899; and at Paris last year. But the benefit of all these conferences consisted not so much in a real promotion of the manifold subjects with regard to the system of commercial education, as in the valuable opportunity afforded for personal acquaintance among representatives of the different countries, and in the no less valuable exchange of personal opinions and experiences. Above all, it was felt that the great drawback was a lack of uniformity among schools for commercial education. Although there were a great many commercial schools in countries represented at these congresses, they were all of different types, schemes, and denominations. Scarcely one school in any country was found to be quite equal in type, scheme, grade, and denomination to that of any school in any other country. A reasonable comparison of the different systems of commercial education was, therefore, impossible unless a general classification of all the existing commercial schools had been made. But a classification of this kind meant a scientific work of extraordinary extent—a work which required not only much time, but also active co-operation of all the countries concerned. Besides this work, there were a great many others of no less importance and necessity. On such works the efficiency and success of all future international congresses were in a high degree dependent.

The first step towards a successful change in this direction could only be made by the foundation of national associations for the development of commercial education in each separate country. With this aim in view, much had already been done, many societies, committees, and associations having already been founded in France, Germany, and England, as well as in Switzerland, Sweden, Norway, Holland, Italy, and other countries. But most of the associations founded in these countries were, to a certain extent, one-sided, consisting chiefly either of persons actively occupied in school-work, or of heads of commercial houses, government officers, etc. It is easy to understand that each of these classes would, though having the same end in view, work on its own lines, and produce, on the whole, but insignificant results. What was desirable and necessary for a vigorous and sound development of commercial education was an association the membership of which might be open to everybody who took an interest in this branch of science, and who, being fully conscious of the importance as well as of the necessity of this work, would be willing to support and promote it. There can be no doubt that those most interested in this matter would be able to work far more successfully if co-operating as members of one and the same association than if each class were to exist and work on its own lines.

The conviction of the necessity of such a general national association may perhaps be taken as the best result of all previous congresses on commercial education. An association of this kind would, above all others, by means of its sound organisation,

be capable of taking the lead, if commercial education would once be made the subject for an international movement.

The first association, founded in 1895 on the principle of a general and active co-operation of all persons taking interest in the progress of commercial education, was the German "Verband für der Kaufmännische Unterrichtswesen." For the rapid progress of its idea, as well as for its admirable organisation and its favourable results, the "Deutsche Verband" is chiefly due to the energetic endeavours of its president, Herr Stegemann. How far the foregoing aims have been realised, in the course of these six years, may be seen by the long list of members, as well as by an account of the chief work undertaken by the "Verband." According to the report of 1899, the total number of members was 516; among these were 79 chambers of commerce, 48 towns, 114 commercial associations, 115 commercial schools, 147 personal members, and 3 governments. The "Verband" is subdivided into sixteen special committees, by means of which any German, residing in any German state, can become a member of the association.

The subjects to which the "Verband" has devoted its attention are, of course, in close connection with German commercial education. First of all, the "Verband" found it necessary to collect the statutes, programmes, educational schemes, etc., of all important commercial schools then in existence in Germany, and to gather together all particulars concerning salaries, fees, pensions, and legal decisions concerning the obligatory form of commercial education, etc. In addition, most valuable researches into the present state of commercial education in other countries were made by special commissioners, who were directed by the "Verband" to study foreign systems of commercial education. All investigations and researches made by the "Verband" and its committees, the reports of the annual meetings, conferences, and congresses held by the "Verband," elaborations of commercial school plans—in short, all communications, speeches, notes, etc., with special reference to the purpose and aim of the association—are contained in a monthly journal issued by the "Verband," under the title of *Mitteilungen der Deutschen Verbander für der Kaufmännische Unterrichtswesen*. In addition to the *Mitteilungen* being prepared as a special journal for the members of the "Verband," another journal, entitled *Zeitschrift für der gesammte Kaufmännische Unterrichtswesen*, offers an admirable review of the present state of commercial education, and of all the progressive steps taken by the "Verband" for the development of practical and scientific commercial education. The great success of the "Verband" in developing, supporting, and propagating the idea of commercial education has been quite in proportion to its zeal and enthusiasm. During the last six years 2 commercial universities, 76 new commercial schools, and a considerable number of commercial evening classes have been added to the number already founded. In addition to these 76 schools, 12 commercial schools will be opened in the course of this month, so that the sum total of new commercial schools will amount to 88.

The idea of founding an international association for the promotion of commercial education was suggested at the Technical Education Congress held at Paris in 1900, during the last exhibition, and the German "Verband" undertook the task of taking the necessary steps, and of making preparations for putting this suggestion into practice. A provisional committee, consisting of about fifteen gentlemen from various parts of Europe interested in the commercial welfare of their respective countries, issued circulars to all persons concerned in this matter. This committee decided to hold the inaugural meeting at Zurich in July 1901.

On Thursday, July 11, at two o'clock in the afternoon, a preliminary meeting was held by the committee at Zurich, for the purpose of considering the principles of the Association, and the subjects to be presented for discussion during the conference. A reception for the members of the International Association was held in the evening, in the beautiful garden of the "Restaurant Belvoir," situated on the Lake of Zurich. The beautiful summer weather added to the complete success of the evening.

On the following day the first general meeting of the International Association was held in the "Aula" of the "Seidenhof," a building belonging to the Commercial Association at Zurich. There were about ninety members present—delegates of twelve countries—when Herr Stegemann, the chairman, took his seat at eight o'clock. Professor E. Waldburger and Professor H. Eberli, both being members of the Zurich Commercial Association, were elected as secretaries. After a hearty welcome given in the name of the Zurich Commercial Association by Professor Hunziker, the president delivered an interesting address in reference to the aim and object of the International Association. In consideration of the great number of important questions to be dealt with at this conference, he suggested that the discussions should not be prolonged by lengthy speeches.

The rules of the society were then read and shortly explained by Herr Habenicht, Leipsic. As all necessary information concerning the rules of the new association is to be found in the useful and interesting book, *Commercial Education at Home and Abroad*, by Frederick Hooper, Secretary of the Bradford Chamber of Commerce, and James Graham, Inspector for Commercial Subjects and Modern Languages to the West Riding County Council, we content ourselves with touching upon the most essential parts. The rules are classed in six divisions—(1) aim and object of the Association; (2) membership; (3) rights of members; (4) organisation of the association; (5) provision of funds; and (6) meetings and congresses.

The aim of the Association is the promotion of commercial education in all commercial and industrial countries. This aim is to be attained by the holding of congresses; the issuing of periodicals written in several languages; the establishment of a commercial education office for the provision of all sorts of information on matters relating to commercial education; in the provision of prizes of standard works on scholastic organisation and commercial education; in the establishment of vacation courses; in the appointment of international committees for considering and discussing important questions on the system of commercial education; and, finally, in the foundation of a regular relationship between institutions of commercial education in different countries.

The organising bodies of the Association will consist (1) of the Central Council, and (2) of the Central Executive Committee. The national committees elect their representatives for the Central Council, every ten members of the national committee of each country being entitled to send from one to six representatives. The Central Executive Committee will be elected by the Central Council, and will consist of nine members, who will choose among their number a president, two vice-presidents, two secretaries, and a treasurer.

Any person interested in commercial education is eligible as a member. Members pay an annual subscription of five shillings. There is also an entrance fee of five shillings. Any person subscribing the sum of £50 will be entered on the list as a founding member of the association; such members will have the rights of membership exclusive of duties. While the annual subscriptions of members will cover all costs incurred, the total sum of the entrance fees is to provide a reserve fund, the interest of which will be used for prizes, scholarships, etc.

These rules were, with only slight, insignificant modifications, unanimously accepted by the Congress, as they only embodied the principles of a statute which will be called into existence at the next meeting of the Central Council and the Central Executive Committee, to be held at the Hague in 1902.

Mr. James Graham gave an interesting lecture on the present organisation of commercial education in England, Germany, and Switzerland, from which countries he had on frequent occasions gathered useful and minute information on all important questions respecting the matter of commercial education. Time being very limited, and the subject treated being inexhaustible, Mr. Graham could only shortly review the commercial education work done in these countries, and for further information referred his hearers to his book.

The next speaker, Herr Diem-Saxer of St. Gallen, gave an account of the system of commercial training in different foreign countries. The particulars he gave of commercial education work as carried on in Switzerland proved how admirably this small country has understood the value and paramount importance of a thoroughly practical and technical education, and with how much zeal and energy the Swiss have worked on behalf of the development of their industry and commerce.

All these subjects being of the greatest interest for everybody connected with commerce and industry, we very much regret that want of space does not permit of quotations from Herr Diem's interesting deductions. But we refer those readers who wish to obtain full information on this subject to the Year-Book of the Association, in which Mr. Diem's lecture will be published.

The conference of Friday lasted till noon. At lunch the vice-president of the Zurich Association, Professor Schurter, an occasional contributor to THE PRACTICAL TEACHER, in an eloquent speech welcomed the guests in the name of the committee; and Professor Bela Schack, Budapest, returned the heartiest thanks of the assembly. The afternoon, until six o'clock, was devoted to several excursions into the neighbourhood; and the visits to the Commercial School of the Canton, to the Commercial Female School, and the International Commercial Institute "Victoria" were of great interest and value to the members of the Association.

At six o'clock a special train conveyed the members of the

Congress to the Uetliberg. At supper, in the Restaurant "Uto Kulm," Herr Fritschi, well known to the readers of THE PRACTICAL TEACHER as president of the Swiss Teachers' Association,* welcomed the guests in the name of the Swiss Government and the town of Zurich; whereupon the heartiest thanks of the Congress were returned by M. J. Siegfried, Paris, who delivered his toast in a most successful manner. The members returned to Zurich by the ten o'clock train.

On the following day the conference began precisely at eight o'clock. A lecture on the plan of a Statistical Year-Book was given by M. Liégeard, Paris, and his paper gave evidence of careful and scientific study of the subject. Herr Lissaur, Berlin, expressed his sympathy with the principles and opinions of the lecturer in reference to the arrangement of the Year-Book, but suggested that, for practical purposes, especial importance should be attached to statistical comparisons. Herr Bela Schack, Budapest, pointed out that the association should compile and edit an encyclopædic work dealing with the state of commercial education in every country. In compliance with the general wish of the Congress, M. Liégeard was entrusted with the preliminary work of compiling the Year-Book.

The Congress ended at twelve o'clock. The next International Congress will be held at Frankfort-on-Main in 1903, and the next Congress of the International Association at Budapest in 1904.

At the banquet given in the magnificent Town Hall by the Zurich Commercial Association, in honour of the Congress, Professor Hunziker proposed a toast for the welfare and development of the newly-founded Association. The president, Dr. Stegemann, returned the warmest thanks on behalf of the Congress for the great hospitality received in Switzerland, for the honour of municipal recognition and welcome, and for all the exertions and arrangements of the Zurich Commercial Association, as well as of the "Züricher Verkehrverein;" and said that owing to this sympathetic and hospitable courtesy, the members of the International Association had been fully able to enjoy the days of the Congress, and will ever remember this time with pleasure and gratitude.

The gain won in the cause of commercial education by this Congress does not lie so much in the scientific statements, reports, and lectures which were given, though they were in themselves of great interest for every member. The gain won by the Congress was a deeper realisation of the necessity of the kind of work in question, and of the importance of international alliance in all matters connected with commercial education. The Congress has proved that the countries represented, being nearly all of them commercial countries, and taking part in international trade work, were fully conscious of this necessity, as well as of the influence which the future work of the Association will be sure to exercise on the development of commercial education.

The work of the International Association will be to gather together all the schemes, ideas, and experiences in reference to commercial education in commercial countries; to examine, explain, and elucidate, to sift and to weigh the whole educational material according to its technical and pedagogical value for the benefit of every nation. The result will be that, although the scheme of education remains national, the school work itself will become more comprehensive, and therefore more able to adequately meet the demands of an international commercial education.

The success of the Association will, of course, depend upon the number of its members and the degree of their co-operation. But we have no doubt whatever that any country interested in international commerce and trade work will join and promote an association the objects and aims of which are the improvement of education, and, consequently, the welfare of nations as well as of individuals.

## HIGHER COMMERCIAL EDUCATION.

SPECIAL contributions on this subject have recently appeared in the columns of *The Times*. In referring to the authoritative sources of information, such as Mr. Sadler's invaluable volumes of special reports, and other pamphlets issued by our Foreign Office, the writer is of opinion that in this country we do not perhaps yet understand the relationship that the higher schools of commerce, specially dealt with in the publications referred to, bear to the whole educational system of their respective countries, and the position such schools occupy in respect to the experimental efforts through which Germany, France, and Belgium are groping their way towards a sounder educational policy. In pleading for the establishment in England of models of Continental institutions, regardless of our own special educational requirements, and in ignorance of the circumstances out of which these institutions have emerged, we run the risk of all imitators—namely, the tendency to seize and carry away the shell and leave the kernel. In the reorganisation of secondary education in Germany, the *Realschulen*, based mainly on the teaching of mathematics and modern languages, laid the foundation of a general education for commercial life. Other and more developed secondary schools continued and completed the same type of school training. Later the *Fortbildungsschulen* (the German type of continuation school) continued the application of the same principles of education, but now specialised mainly for the benefit of young men engaged in mercantile business as apprentices or clerks.

One of the happy features of the German educational system as a whole is that the relationship of its several institutions is determined not so much by a rigid organisation as by a spontaneous tendency to co-operate. Co-operation on the part of various other educational institutions and authorities is now resulting in the creation of *Handelshochschulen*, or higher schools of commerce, either as separate and independent institutions or as departments of the existing technical high schools. Alongside the higher commercial schools there are growing up in the large towns admirably organised commercial museums and specialist libraries. The development of these museums marks an important stage in the efforts to realise the ideal of organised knowledge towards which the German merchant is moving.

The *École des Hautes Études Commerciales* in Paris, like the German institution, occupies a position of compromise between the secondary school and the university. Formed at a time when the university institutions of France had not recovered from the effects of the Revolution and Napoleonic rule, the French higher schools of commerce were necessarily established outside the university. Since the disasters of 1870 the educational system of France has undergone a slow but thorough regeneration. The educational renascence has manifested itself in two different phases. The earlier phase was one of quantitative expansion. In the sphere of higher education it took the form of a vast and rapid multiplication not only of professorships and lectureships, but also of buildings, laboratories, and equipment of all kinds. The result is that the French universities are now endowed and equipped with a plenitude of educational resources comparable to, and, in the case of Paris, exceeding, those of the leading German and American ones. It is, for instance, claimed for the University of Paris that in mere numbers of staff and students it is practically the equal of all the teaching universities of England and Scotland together. It is to this earlier period of quantitative expansion that the *École des Hautes Études Commerciales* belongs, as also do most of the provincial higher schools of commerce. The other and later phase of the educational renascence—only now emerging—has been one not of quantitative but of qualitative advance, not of expansion but of concentration. Its watchwords are, in the phrase of Monsieur Liard, the Permanent Under-Secretary of State for Higher Education, who perhaps more than any other individual has inspired the newer movement, "freedom and co-ordination." The ideal is one of freedom for every region and every student to work out their own salvation in the sphere of higher education; and, on the other hand, the aim is towards the co-ordination of the overwhelming mass of specialist studies, in order that the student may find an opportunity of making the most and not the least of his freedom. This newer policy in the sphere of higher education has not yet affected the higher schools of commerce, chiefly perhaps because they are under the Ministry of Commerce and not under the Ministry of Education. But that it will modify them sooner or later may be assumed.

The main lesson to be learned from Continental experience seems to be this—that we should not imitate the formal organisation of Continental institutions, but should develop those lines in our existing institutions which appear to lead most directly to the natural goal of all schemes of higher commercial education. That goal is seen, in each of the instances examined, to be inclusion within the sphere of university resources and organisation. And can there be any doubt that the proper theatre for experiment in higher commercial education is, in this country, at the universities and university colleges of the great cities and towns? And, further, can it be doubted that the results would probably be beneficial in proportion to the degree of earnestness and harmony with which in each locality the university, the civic authority, and the local chamber of commerce can be induced to co-operate in the planning and in the execution of whatever experimental endeavours are made?

* Our interview with President Herr F. Fritschi appeared in THE PRACTICAL TEACHER, November 1899.—ED.

# Current Notes on Things in General.

### Our Latest Foreign Possession.

SIR JOHN MURRAY has recently explored Christmas Island, our latest foreign possession. It is situated in the Indian Ocean, two hundred and twenty miles from land, and is covered with dense forest. The island is under the Straits Settlements Government, and a resident magistrate has been dispatched thither from Singapore, together with an official of the Public Works Department, a scientific commission, and a force of thirty-five police. There were thirteen whites on the island at the time of Sir John Murray's visit, together with seven hundred and twenty Indian coolies engaged in working the rich phosphate deposits. The climate is like a hot English summer. The fauna of the island is interesting. It includes only five mammals. Two are species of rats hitherto undiscovered. The whole island is overrun by curious red crabs eighteen inches across. They travel in bodies like ants, and are excellent tree-climbers.

### The Colouring Matter of Seaweeds.

Phycocyanin, a fine indigo-blue colouring matter, soluble in water, is found in blue-green algæ, and may be obtained in a crystalline state by treatment with ammonium sulphate. It does not seem to exercise any toxic effect on fish.

### Marble in Alaska.

Marble quarries have been lately discovered in Alaska, and promise to be almost as valuable as the Alaskan gold mines. The quarries, which are in the southern part of the territory, yield marble of finer quality, and more beautiful, than any now produced in the United States. It is said to be fully equal to Italian marble.

### A New Peptonising Ferment.

Professor L. Macchiati has discovered a new peptonising ferment, secreted by the glutinous hairs which clothe the stalk of the inflorescence of a species of *Salvia—S. glutinosa*. Through the agency of this peptonising ferment the insects which are captured and detained by the secretion are digested, as in the sundew or Venus's flytrap.

### Queen Victoria and the Geographical Society.

Queen Victoria was for sixty-three years a patron of the Royal Geographical Society. When she was only fourteen, she presented to a Polar expedition a case of mathematical instruments and a pocket compass. Her next gift was to the society. It consisted of two gold medals granted annually. Not long before her death she sent to the society her good wishes for the success of the Antarctic expedition of 1901.

### A New Rennet Ferment.

Pegnin, a new rennet ferment, is being used to render milk more digestible for infants. It causes the milk to set, after which it is churned, so as to produce a body of nearly uniform consistence. The flavour is said to be like that of fresh milk, so that it is easily taken by children.

### Foreigners in Norway.

Now that so many English go to Norway, a Bill—which will come into operation in January 1902—has been passed to regulate the movements of travellers and foreigners in Norway. All persons whose occupation it is to receive travellers as night-lodgers must report the same to the police, and keep a list, in a book approved by the police, of all persons whom they receive. The subject of a foreign state may be sent out of Norway for omitting to report himself after arrival, or if he is found on arrival not to be in possession of sufficient means of support, or without prospect of obtaining lawful employment in Norway. Until the question of any foreigner's ejectment is finally settled, he is liable to arrest and imprisonment.

### Wireless Telegraphy and the Royal Tour.

The Marconi system is laughingly deplored by Mr. Knight: "In a few years' time every liner will have all the latest news, and even private correspondence, wired to those on board from every headland, and there will be no more peace at sea. The *Juno* (escort of the *Ophir*) never omits an opportunity of conversing with ship or shore by wireless telegraphy." The Cunard Company contemplates fitting an instalment of the Marconi wireless telegraphy system on board its Atlantic ships, and an important series of Marconi experiments is being carried out between France and Corsica. They are being conducted by the Marconi Company, in the presence of representatives of the French naval, military, and postal authorities. Telegrams have been successfully sent between La Bragne, near Antibes, on the French side, and Calvi on the Corsican side.

### Pitcher Plants and Digestion.

Clautrian has recently published an exhaustive research on the process of digestion in the pitchers of Nepenthes. He confirms the observations of previous workers that the glands of the pitchers secrete a zymase which in acid solution is capable of digesting albuminoids. As happens in Drosera, the full excretion of the ferment and its accompanying acid does not take place unless a foreign body is present. After the process of digestion there is found in the pitchers an amber-coloured fluid. It contains an unknown colouring matter, which becomes red when treated with an alkali. This is not a product of digestion, but arises from the tannin of the glands. As the albuminoids which are liberated are very quickly absorbed even in winter by the plants, at a lower temperature than that at which complete peptonisation takes place under glass with the zymase, it seems to follow that complete digestion is not necessary for the absorption of the nutrient material by the plant. Albumens are assimilated as soon as they are set free. When the pitcher becomes filled with insects they begin to decay, and the plant then assimilates the nitrogen in the form of ammonia or of amido acids.

### The American Arctic Expedition.

The American whaler bought by Mr. Baldwin for his journey to the North Pole was called the *Esquimaux*. It was employed in the whaling industry for nearly thirty years. It was then chartered as a private yacht, and had a suite of commodious cabins specially built in the deck-house aft. The ship has since been fitted out with new masts and a new forecastle, and has been practically redecked. She is a ship of eight hundred tons, with one hundred horse-power engines, and has a speed of seven knots. She is a good sea boat; and last year, when she was in Davis Straits, she succeeded in getting out of the ice-pack from which a number of other whalers were unable to extricate themselves.

### Denmark and her Colonies.

Within the last few years Denmark has experienced a remarkable revival of commercial activity. Her manufac-

tures at home and her trade abroad are rapidly expanding, and she is now regretting the sale of her Indian colonies in 1845. The Danish West Indies are now likely to play an important part. St. Thomas is a valuable naval station, and is to be popularised as a port of call and refit, and as a distributing centre for trade. The King of Siam has subsidised the Danish line of steamers plying among the smaller ports in the neighbourhood of the Straits of Malacca and the Gulf of Siam, and a new Danish line of transatlantic steamers has now come into operation.

### The Preservation of Soft Fruits.

Dr. Brown, the medical officer of the Victorian Agricultural Department, has concluded some interesting experiments with regard to the preservation of soft fruits. He has successfully preserved soft fruit by treating it with hydrocyanic acid gas, to destroy mould and fungi before the fruit is placed in a cool storage chamber. A quantity of fruit thus treated was taken out of a cold chamber after having been there seven weeks, and was found to be in good condition.

### American Coaling Stations.

It is projected to establish a chain of coaling stations round the world for the use of the United States Navy. Negotiations are in progress with Portugal for the acquisition of one of the Azore Islands, and with Holland for a station on an island off Venezuela. This action on the part of the American Government is important, as the administration wants to acquire sovereignty rights over these stations, and not the mere privilege of constructing coaling stations. The State Department has already secured title to stations at Yokohama, and at Pitcher Lake, near La Paz, Mexico. Work is progressing at naval stations at Honolulu and Tutuila, Samoa, and an appropriation is available for the construction of a depôt at Guam. On the west coast of Luzon there is soon to be a coaling station, and Manila will also be made a rendezvous for American warships.

### Japanese Industry and British Trade.

Japanese shipping companies are rapidly taking away all the trade of British and other foreign competitors. The United States now export to Japan less than half the amount they import from Japan. France exports to Japan less than one-third of the amount Japan exports to France. Japanese coals, Japanese beer, and Japanese matches have no rival in the East. China is being overrun by Japanese merchants and traders.

### Afrikander Taal.

An interesting little book of ninety-four pages, entitled *Elementary Lessons in Cape Dutch*, has just been published, at 1s. 6d., by Messrs. Williams and Norgate, the well-known publishers and foreign booksellers of Henrietta Street, Covent Garden. The Afrikander Taal is here described as "an offshoot of the Dutch language." Olive Schreiner once wrote of it as a dialect which bears the same relation to Dutch as the dialect of Uncle Remus does to English. This "Muddertaal" of the Boer is, in fact, so distinct from the Dutch that a Boer boy studying at the Cape would find it as difficult to pass an examination in literary Dutch as he would in either English or French. To impart such a notion of the language as may be made a foundation for its fuller acquisition on the spot, is the practical aim of the authors of this little manual. To those familiar with the sounds common to the French and German languages, the pronunciation of the Taal presents no difficulties. The grammar, too, is simple and easy, there being practically no inflections. The book contains rules, vocabularies, a good supply of exercises with key, and, in addition, some fifty pages of conversational dialogues arranged in parallel columns. To those outward bound such a book is sure to be useful, whilst to those who dwell at home, and who love linguistic study, a run through these interesting chapters will afford an evening of profitable enjoyment.

## ABOVE ALL HEIGHTS.

"Ueber allen Gipfeln ist Ruh."—GOETHE.

I.

WORK for work's sake, and for our art, I say;
Not for ourselves—no, not for our best friends,
Nor heart's content when our brief day's work ends;
A thousand times less for men's praise or pay.

II.

To crown the finished task, rest comes unsought;
But seems it finished to the Power above
And Master even of rest, until with love—
For no reward, but as God made—we've wrought?

III.

"Above all heights is rest." At set of sun
Spirits perturbed in darkening valleys moan,
"Because we strove for wealth and fame alone,
Our work unfinished and ourselves undone!"

MARRION WILCOX (*Harper's Magazine*).

## FROM THE PUBLISHERS.

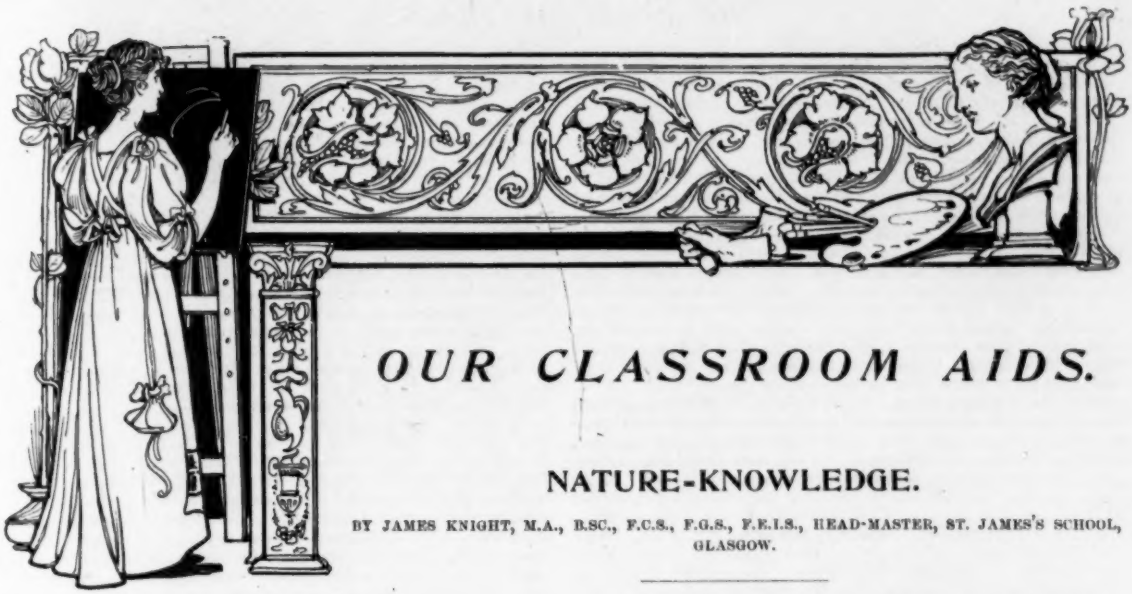
**Pelman's Memory Training.**—We notice that the Pelman system of memory training, which is every day becoming more widely known and used in England and abroad, has now been translated into the Russian language. Hitherto the lessons have been conducted only in English, French, German, Italian, and Dutch. The addition of Russian opens a new field for this most successful system. No doubt the secretary of the Pelman School of Memory Training, at 70 Berners Street, London, W., would be pleased to give further information upon application.

**The University Tutorial Press** announce that Professor E. Weekley, of University College, Nottingham, has provided for the use of candidates for London University Matriculation, and other examinations of similar standard, a text-book incorporating the simplifications of French grammar authorised by the recent decree of the Minister of Public Instruction. As, however, learners are bound to meet in their reading examples of constructions from which deviations are now tolerated, the old rules have been given, but special attention is called by means of vertical rules to the provisions of the decree. A Key to the Exercises and Passages for Translation into French is issued for the use of teachers and private students only. Both the Course and the Key are to be issued without delay for use in the term now commencing.

**In "The Cornhill Magazine"** for October, Mrs. Richmond Ritchie's Blackstick Paper, entitled "Nohant in 1874," is devoted to an appreciation of George Sand. Mr. Reginald Blunt contributes some reminiscences of the Carlyles, and some letters which were written by Mrs. Carlyle to an old servant, and are not included in any published edition of her correspondence. Mr. Stanley Weyman continues "Count Hannibal;" and Dr. Fitchett, in his "Tale of the Great Mutiny," has reached the siege of Delhi. There is the usual instalment of "The Londoner's Log Book." Mr. Quiller-Couch has a seasonable paper on "Laying Up the Boat," and Mr. G. S. Street a study on "The Persistence of Youth," while Mr. E. V. Lucas discusses "The Circus." Amongst other papers, Mr. Patrick Vaux gives, in "Cochrane Redivivus," an imaginary incident in the naval warfare of the future.

**American School Books.**—Messrs. D. C. Heath and Co., the well-known publishers of Boston, announce that, owing to an increased demand for their publications, they have opened a London branch at 15 York Street, Covent Garden. A modern language series, a pedagogical library, and a series of English classics are among the firm's productions.

**For Commercial Students.**—Several important new features have been added to Pitman's *Phonetic Journal*, in order to meet the growing demand for guidance in relation to various branches of commercial education. In the issue of 5th October a Commercial Guide is commenced, which will furnish a comprehensive explanation of every description of business transaction, with illustrative documents. The business use of modern languages is dealt with in a series of practical examples of French, German, and Spanish correspondence.



# OUR CLASSROOM AIDS.

## NATURE-KNOWLEDGE.

BY JAMES KNIGHT, M.A., B.SC., F.C.S., F.G.S., F.E.I.S., HEAD-MASTER, ST. JAMES'S SCHOOL, GLASGOW.

### PLANT LIFE: GERMINATION.

IN beginning a course of observation lessons on plant life, it is well to have some plant capable of showing, if possible, the main features of vegetable anatomy at a glance. Such a plant may be found in the foxglove or other slow-flowering plant, which shows not only root, stem, and leaves of different kinds, but also every stage of fruition, from flower-bud at the top of the plant to ripe fruit at the base of the flowering head. These leading features are already familiar, and the pupils may be asked to compare this with other flowering plants, leading to the generalisation that the ends of roots are white, stems and leaves are green, while flowers are of all shades and colours. In all plants the roots, stems, and leaves have similar functions to perform—roots for attachment, and absorption of water and salts in solution; stems for support, and conduction of material; leaves for feeding, breathing, and perspiring. Flowers, however, exist to ensure fertilisation of the ovule, and so to form fruit and ultimately seed; so they vary greatly in colour, shape, and odour, adapting themselves to the special agencies by which fertilisation is to be effected, mechanical or animal. The special devices to ensure fertilisation will come up later on in discussing flowers; meanwhile, we begin with the seed.

Take any stone fruit, say a Victoria plum, and dissect it. First there is an outer skin, which may be peeled off; then there is a soft, pulpy mass, forming the edible portion of the plum; thirdly, there is the stone. Try to break this with the fingers, or even with the teeth, and a fair idea will be got of the energy of life as displayed by the young plant within when the stone is planted. Break the stone and observe the kernel, with its outer skin, central mass of white matter, mainly starch, and the embryo in the centre with its two seed-leaves or cotyledons. Take now some large beans which have been soaked in water, and compare them with dry beans. The former have swollen considerably, and the outer leathery skin is puckered and wrinkled, peeling off quite easily. On squeezing the wet bean, water will be seen oozing from a pore at one side. Peel off the skin and split the bean, so as to show the two white, fleshy cotyledons or seed-leaves with the young plant lying between them like a hinge. The embryo or young plant thus consists of cotyledons or food-leaves—generally one or two, except in the pine family, which have five or more—and the active portion of the young plant consisting of infant root (radicle) and shoot (plumule). Encourage the class to discover seeds in our common fruits, and especially to see how the seeds are protected. Generally speaking, in succulent fruits, intended to be eaten by birds and other animals, the protective coat is stony, as in grapes, plums, etc.; so that even if the fruit is swallowed, the seed is not attacked by the digestive juices of the animal, and is ready to germinate when voided. In pod-bearing and other plants which open their seed-cases the outer coat is leathery, as in beans and peas; in others, as the walnut and acorn, the seed-coat is thin and papery.

To show that the cotyledons or seed-leaves are rich in starch, a drop of weak tincture of iodine may be placed on the white surface of a bean: a blue tint shows the presence of iodine. Boys often chew wheat grains, thus digesting the starch into malt sugar, which is then swallowed, and leaving behind a yellowish sticky mass which they call chewing-gum or cracking caoutchouc. This is gluten, an albuminous or nitrogenous food-stuff resembling white of egg in its digestive properties; and it is contained, not in the cotyledons themselves, but in the form of a store of food-stuff surrounding these. This same food store is often rich in fats as well, thus containing representatives of all the great classes of foods—proteids, carbohydrates, and fats. Familiar examples of fat extraction from seeds will be found in linseed oil from flax seed, olive oil, castor oil, cotton-seed oil, etc.

For experiments in germination some shallow boxes are wanted, which may be filled with damp sawdust or sand to a depth of 4 to 6 inches. Sawdust is better than soil, since the seedlings are withdrawn more easily without risk of breaking root-threads; and, besides, sawdust may be watered with various culture solutions in illustration of plant chemistry. Soak some peas and beans in water for a night, then plant them out in such boxes, a fresh dozen every week or fortnight, so as to have plants in all stages available for examination at any one lesson. The ordinary temperature of a classroom is 15° C. or 60° F. at least, and most plants will germinate readily at such a temperature even in the month of January. For convenience the following data are given, from Kerner and Oliver's *Natural History of Plants*:—

| | | | |
|---|---|---|---|
| Pea at 4·6° C. . . | 5 days. | Maize at 10·5° C. . | 11 days. |
| Poppy at 4·6° C. . | 10 ,, | Sunflower at 10·5° C. | 25 ,, |
| Beet at 4·6° C. . . | 22 ,, | Tomato at 15·6° C. . | 6 ,, |
| French beans, 10·5° C. | 3 ,, | Melon at 18·5° C. . | 17 ,, |
| Timothy grass, 10·5° C. | 6 ,, | | |

The points for the class to observe are that seeds require for germination air, water, and warmth, and that each plant has its own favourite temperature. In order to show the influence of temperature, some seeds may be grown indoors and under a glass tumbler, others indoors in the classroom, others outside on a window-sill; and it will be found that, within certain limits, a high temperature—60° to 80° F.—promotes rapid germination. Thus, white mustard seed, grown at 4·6° C., germinated in 2 days, but at 10·5° C., in 1½ days; hemp, under similar conditions, took 3 and 2 days respectively; flax, 6 and 3½ days; maize, 6 and 3½ days; and so on.

To show that a fair amount of heat, and also of carbonic acid, is given off in germination, the following simple apparatus may be fitted up. Take a wide-mouth pickle bottle or similar vessel and cover the bottom with fresh lime-water; then lay on the bottom a small saucer or other dish containing soaked peas lying on wet blotting-paper. Close the bottle by an air-tight cork carrying two thermometers, one of which dips into the little heap of peas, and the other carries a wet rag to serve as a wet-bulb thermometer. See that the cork is thoroughly air-tight, or use an indiarubber stopper, otherwise any gas formed would escape. The presence of carbonic acid gas is shown by milkiness in the lime-water, while the heat evolved in germination will produce a higher reading on that thermometer which dips into the peas. The reason for attaching a wet rag to the bulb of the other is to equalise both in respect of moisture. Since the peas are moist, the thermometer in them is practically a wet-bulb

instrument, and would therefore, *ceteris paribus*, show a lower reading than in air; by making both thermometers wet-bulbs, any rise in temperature due to germination is at once observed.

The fact that water is needed for germination is evidenced by the swollen appearance of peas, beans, etc., which have lain in water or in damp sawdust. Several peas may be started at once, under differing conditions of moisture, and the time taken to germinate carefully noted; or the whole series may be examined at the end of a fortnight, to see which has made most progress. A very practical way of showing how seeds absorb water is to fill a bottle with peas, cover the mouth with canvas tied firmly down with stout cord, and then put it in a pail of water. The peas swell to such an extent that the bottle is burst in from two to four hours. The disarticulated skulls which one often sees in anatomical museums are prepared by the slow but resistless expansion of peas or other seeds inserted within the cavities and then soaked in water, and the same method may be applied to widening boots which have become unduly shrunk.

That air or oxygen is also required may be shown in several ways. Soak some peas in water; then remove the skins and pass them up into a boiling-tube filled with mercury, and standing inverted over a mercury trough. In this case no air gets at the plants, and by next day no further growth can be traced. Even water may be used instead of mercury, since the amount of free oxygen dissolved in water is not generally sufficient for growth. Germinate some beans till their roots are nearly an inch long; then impale them on large "blanket" pins and divide them among four jars. Into No. 1 put three beans, and add water till the cotyledons are entirely covered, thus excluding air; put other three in No. 2, and partly fill with water, so that the roots are growing in damp air. In these cases the growth will be more rapid in the second jar, since, as already stated, water does not contain a sufficient supply of free oxygen. A control experiment may be made by fastening some beans in an empty jar, to show the effect of plenty of air without water: in this case the plant dies. Into No. 3 jar put other three beans so that the water just covers their roots, and similarly fit up No. 4, using, however, instead of water, a 1 per cent. solution of common salt. On measuring after twenty-four hours it will be found that growth has been retarded by the salt.

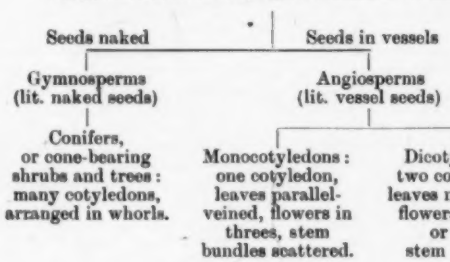
In all these experiments the beans should be placed with their flat surfaces vertical, and the hilum, or scar, downwards. In this way the radicle, or infant root, grows straight down without curving, and is thus more capable of measurement, as well as better suited for planting out. Peas are best germinated with the cotyledons horizontal if they are afterwards to be pinned out, since they must be pinned through both cotyledons. While germinating in damp sawdust they may be covered with a piece of slate or glass, to regulate temperature and moisture.

Besides the treatment of peas and beans in sawdust or powdered peat, a series of interesting experiments may be made by growing acorns in earth and in water—in the latter case supported on glasses, after the manner of hyacinths. Or a tumbler of water may be used, covered with a wide-meshed muslin cloth or piece of netting, so as to support the acorn and just allow it to dip into the water; then another tumbler of unequal size may be inverted over the former, to serve as a propagator glass. A very pretty classroom object is got by growing white mustard seeds on damp flannel, a sponge, an old stocking, etc., hanging up in the room and watered regularly. Although this is not, strictly speaking, germination, a companion experiment may be made with a potato. Cut off one end square and scoop out the potato, leaving about one-third of an inch in thickness; then hang this up lantern fashion, and fill up with water. In a week or two, depending upon atmospheric conditions in the classroom, young shoots will start from the "eyes" of the potato, and will continue to form till the food supply is exhausted. A similar experiment may be started with onions grown in water like hyacinths, and with a carrot top, one inch thick, grown in a saucer with a little water. Several such plants should be started at regular intervals, say once a fortnight, so as to obtain a simultaneous demonstration of the conditions of growth. The pupils might be asked to make life-size drawings of these, dated, for the sake of observing changes of form and size; and in some cases clay models might be made, showing the development of root and stem. For examples of this see Dr. Wilson's *Nature Study in Elementary Schools*, pp. 133–143 (Macmillan, 3s. 6d.).

One of the first points to be observed is geotropism, the opposite behaviour of root and shoot—the former invariably curving down towards the earth, seeking moisture, and turning from the light; the latter as invariably shooting upwards to the light. In order to watch the radicle, it is well to grow a bean in a box of sawdust with a glass front sloping slightly back as it descends. In this way the young root, in growing vertically downward, presses against the glass, and remains in view for the rest of its course.

In order to study the behaviour of different plants with respect to their cotyledons, and thus to begin classification, the following seeds should be germinated: pea or bean, kidney bean, sunflower (especially for winter work), onion, castor-oil plant, oats and wheat, pine or fir cone. For details of growth in these cases, see especially Wishart's *Botany*, in the Self-Educator Series (Hodder and Stoughton, 2s. 6d.). The pupil may thus arrive at the rough classification of plants into those with two, one, or no cotyledons; and his attention should be called to the fact that this division, while based nominally on number of cotyledons, runs through all the organs. This is of some practical consequence, since it is rarely possible to get a plant in the cotyledon stage, while it is always possible to get at its root, stem, and leaves, and very often its flower as well. In this way lead him to see that dicotyledons—plants with two cotyledons—have leaves with a network of veins, their flowers in rings of four or five, and their stems, when woody, showing annual rings of growth. Monocotyledons, on the other hand, as lilies and grasses, have leaves with parallel veins, and the parts of their flowers in multiples of three, while their stems show no rings, but merely scattered bundles of wood fibres. Lastly, the plants without cotyledons are all flowerless plants, and include the ferns, mosses, club-mosses, horsetails, lichens, algæ, and fungi already discussed. Gymnosperms—represented in this country by the pine family, including the pine, fir, cedar, cypress, larch, yew, and juniper, as well as the common "monkey puzzle" of gardens—have several cotyledons, usually emerging one after the other in germinating, and arranged in a whorl; but all these plants are too familiar to be misplaced in classification, and their cones serve as a sufficient index of their exceptional position. The scheme of classification at this point, then, stands thus:—

PHANEROGAMS OR FLOWERING PLANTS.


Seeds naked
Seeds in vessels
Gymnosperms (lit. naked seeds)
Angiosperms (lit. vessel seeds)
Conifers, or cone-bearing shrubs and trees: many cotyledons, arranged in whorls.
Monocotyledons: one cotyledon, leaves parallel-veined, flowers in threes, stem bundles scattered.
Dicotyledons: two cotyledons, leaves net-veined, flowers in fours or fives, stem in rings.

## STAR MYTHOLOGY FOR CHILDREN.

FROM distant Hyderabad comes the request that we should devote some small portion of our space to the consideration of a few of the pleasing myths that are wrapped up in the names of the constellations. We readily acquiesce, because we are at one with Sir Robert Ball in believing that the study of the stars "might well form a part of the education of every child in the kingdom," and because, also, we hold that the narration of these old-time stories is a pleasant enticement to such a study. We shall, of course, only touch the fringe of the subject; but enough will be said to whet the appetite, for the complete satisfaction of which we refer our readers to Brown's translation of the constellation poetry of old Aratus.

Star study should begin with the location of the Pole Star. Taking this as centre, there will readily be recognised as forming a circle with this as centre, and about equidistant from each other and from the pole, two star groups and two very bright stars. The groups are **Ursa Major** (the Great Bear, the Plough, the Wagon and Horses or Charles's Wain) and **Cassiopeia** (the Lady's Chair), the one being directly opposite the other. The bright stars are *Capella* and *Vega*, the former of which is in the direction towards which the Plough is apparently being pushed, the latter being opposite to this on the other side of the Pole Star. *Capella* is the brightest star in the constellation **Auriga**; *Vega* is cynosure of the constellation **Lyra.**

Again, if a line is drawn from the Pole Star over the top of Cassiopeia, it will lead to the middle of a great square or trapezium formed by four stars of the second magnitude, three of which belong to the constellation **Pegasus**; the fourth (namely, that at the left-hand corner at the bottom) belongs to another constellation—to wit, **Andromeda**, the chief stars of which form a slightly-curved line leading right under Cassiopeia to a bright star belonging to the constellation **Perseus**. Following this star upwards and downwards will give us the whole of the Perseus group; moreover, this line will be seen to bifurcate in a double curve, one branch leading to Capella in Auriga, the other to a group known as **Taurus**, to which belong the well-known *Pleiades*. Again fixing the eye on the Pole Star, an imaginary line is to be drawn through Capella, and continued for about one and a quarter times the distance between these two stars. This will bring the eye to the magnificent trapezium group **Orion**, with its notable first-magnitude stars *Betelgeuse* and *Rigel*, and its famous belt. Producing the belt of Orion downwards, the eye is conducted to *Sirius* (the Dog Star), the brightest star in the whole of the heavens.

A pause should now be made in the observation of new groups until practice has perfected the knowledge of the groups and individuals the names of which have already been given. Whilst this is being done, the myth that has accumulated round the name of Andromeda may fittingly be given.

Cepheus, king of Ethiopia, had married Cassiopeia, to whom in due course was born Andromeda the beautiful. Very naturally the queen was proud of the beauty of her daughter, but unfortunately this pride found expression in boasting. Above all, she boasted that Andromeda was more comely than the sea nymphs of the Mediterranean, the so-called Nereids, the fifty daughters of the divine Nereus, who dwelt at the bottom of the sea, and had dominion over the whole of the Mediterranean. For this presumption Neptune—to whom the Nereids complained—sent a sea monster to devastate Ethiopia, and caused the sea to flow over the land. To the terrified people the oracle of Ammon made known that the waters would not recede, nor would the monster withdraw, until atonement had been made by exposing the unoffending maiden to the fury of the monster; and accordingly she was bound to a rock upon the shore, and was left to the mercy of the avenging beast, from whom, however, she was, after a while, delivered by the hero Perseus. How Perseus came to be in Ethiopia will be seen from the following account of the deliverer of Andromeda:—

It is related that Acrisius, king of Argos in Greece, had been warned by an oracle that his daughter Danae should bear a son, who should kill his grandfather. To prevent this, Acrisius shut Danae up in a brazen tower. This did not prevent her from being wooed and won by Jupiter; and a son was born to the couple—namely, the hero who later on released Andromeda from her perilous position. King Acrisius, in order that he might be safe from the grandson just born, shut up mother and child in a chest, and cast them into the sea. Jupiter did not intend that his wife and child should perish, so he caused the chest to come ashore on the island of Seriphos; and soon the twain were under the protection of Polydectes, the king of the country. This did not long benefit the youth, for the king, having fallen in love with Danae, wished to get rid of her son. Accordingly he prevailed upon Perseus to attempt the impossible feat of slaying the Gorgon Medusa, who lived with her two immortal sisters, and who, although mortal herself, shared with them the power of turning into stone all who looked upon her, and who also, like them, was horribly repulsive, having serpents in place of hair, being winged, and armed with frightful teeth and brazen claws. Assisted by Mercury and Minerva, Perseus attacked the monster, whom he found asleep, looking upon her by means of a mirror, and so avoiding her terrible glance. He succeeded in cutting off the head of Medusa, and then fled, pursued by the two remaining monsters, finally reaching Ethiopia, where he released Andromeda, and soon afterwards married her and became reconciled to his grandfather Acrisius, who seems to have forgotten his old fear. The oracle was right, notwithstanding; for one day, when playing at quoits, it chanced that the quoit of Perseus struck his grandfather a mortal blow; and so, much to the grief of Perseus, the awful prophecy was fulfilled. Ultimately Perseus lived quietly and happily with his wife Andromeda, and is said to have founded the city of Mycenæ in Argolis. After death, not only Cassiopeia, Andromeda, and Perseus, but also Cepheus, were all turned into constellations.

The constellation **Cepheus** may be found by drawing a line through the two right-hand stars of Cassiopeia, which point to two stars close together between Cassiopeia and the Pole Star. These belong to the star group **Cepheus**, which is named after the father of the Ethiopian queen.

Milton refers to this myth in *Il Penseroso* as follows:—

> "Or the starred Ethiop queen that strove
> To set her beauty's praise above
> The sea nymphs, and their powers offended."

The constellation **Pegasus** is connected with this same story, since the winged steed Pegasus is fabled to have sprung from the neck of Medusa when her head was cut off by Perseus. The steed was called Pegasus because he made his appearance near the sources (*pegai*) of Oceanus. Whilst drinking at a fountain in Corinth, the winged steed was caught by Bellerophon, who attempted to ride up to heaven on his back. Whilst in mid-air Jupiter caused a gadfly to sting the horse to such purpose that Bellerophon was thrown and fell to the ground, becoming, as a result of this fall, lame for life. Finally Pegasus was received into heaven, and was used by Jupiter to carry his thunder and lightning, for which he was rewarded by the dignity of a constellation, the well-known Square of Pegasus.

**Orion** was a giant hunter who was beloved by the chaste Diana, the goddess of the chase. Becoming jealous of Orion, Apollo one day challenged Diana to hit with an arrow a tiny mark far out at sea. Diana hit the mark, and discovered all too late that it was the head of Orion, who was bathing at the time. After his death Orion was placed amongst the stars with girdle, sword, and club, and a lion's skin.

**The Pleiades** were the seven daughters of Atlas and Pleione, and the virgin companions of the goddess Diana. Being pursued with their mother by the giant hunter in Bœotia, they, in answer to their prayer, were turned by the gods into doves (*peleiades*), and were placed among the stars. Of the seven, six are described as visible, the other being invisible. The fable goes that this latter fell in love with a mortal man, and was so overcome with shame that she shrank into invisibility.

We cannot pursue the subject further, but it is hoped that the suggested admixture of astronomy and mythology, as roughly given in what has preceded, may form the basis of more than one interesting star lesson, and may incite the teacher to further efforts in this direction on his own initiative. Star maps, etc., will be found in Cartwright's "*Section Two*" *Physiography*.

# GENERAL GEOMORPHOLOGY.*

BY A. J. HERBERTSON, PH.D.

## II.

**Classification of Rivers.**—A stream whose line of flow is directly determined by tectonic causes, and not by a valley it has hollowed out for itself, is known as a consequent stream. The rivers in longitudinal valleys of young folded mountains, and in rift valleys, form one class, and those which flow along the natural slope of land which has been elevated independently of the underlying structure are another. Some writers restrict the term *consequent* to the latter.

The structure of the strata has ultimately an effect on

* This article is reprinted, by permission of the author and publishers, from *A Handbook of Geography*, by A. J. Herbertson, Ph.D., which will shortly be issued by Messrs. T. Nelson and Sons.

all streams, which discover the more easily eroded parts and carve their beds in them. A consequent river may cross the strike of the rocks, and if it does so, its tributaries which flow parallel to the strike, reaching a relatively soft layer, will deepen their beds more rapidly than the main stream can.

If we consider a series of such main consequent streams, the one with the deepest bed will permit its tributaries to lower their beds more than those of its neighbour. The divide between two such tributaries will gradually move away from the lower towards the higher main river, and ultimately will reach it, capturing its head-waters and beheading its lower course, which will now flow as a shortened consequent river. A river such as this tributary, which has washed out a longitudinal valley, whose course is therefore determined by the underlying arrangement of the layers, and not by recent tectonic movements, is called a subsequent river.

As the subsequent river deepens its bed still further, little streams flow towards it, in the opposite direction to the original consequent rivers, and sometimes along their ancient bed. These are obsequent rivers, and many run from the Chilterns to the Thame, or from the Cotswolds to the Avon-Severn. This is an adjusted river system.

The subsequent erosion longitudinal valley, such as that of the Great Ouse, the Thame, or the Upper Tennessee and other Appalachian rivers, must not be confused with the consequent tectonic longitudinal valley of the Upper Rhone.

Antecedent rivers flowed before the crustal movements which shaped the present configuration, and persisted in their course in spit of the changes of configuration caused by these movements. Many great transverse valleys, such as those of the Indus or the Sutlej, were formed by rivers flowing through them and eroding their beds more rapidly than the mountains or hills were raised across which they now flow.

Superimposed or superinduced rivers are those which have worn away the upper rocks over which they formed consequent streams, or in which originally they had cut an adjusted river system, and have reached lower unconformable layers, which had nothing to do with shaping their course, and to whose structure the stream lines have at first no relationship.

**Lakes and Marshes.**—Lakes are hollows on the earth's surface filled with water which is not supplied directly by the ocean.

They occur in old volcanic craters, as Lake Avernus in Italy, and the lakes of the Eifel or Auvergne; in the irregularities of the surface of old glacier moraines, as in Finland; in valleys dammed by volcanic deposits, as Yellowstone Lake; or glacial deposits, as most Scottish lakes; by landslips, as many small lakes in the Alps and other young mountains—for example, the Gohna Lake in the Himalayas; by ice itself, as the Märjelen Lake at the Aletsch glacier; by river deposits, as the Silser and Silvaplana Lakes in the Upper Engadine, or as the crescent lakes of the Mississippi, or the Danube and Tisza (Theiss) in Hungary, and other deserted river channels. They are formed in tectonic hollows and furrows, such as the continental depressions, where waters accumulate only to evaporate, as in the Great Salt Lake or the Caspian; in rift furrows, like the Dead Sea or Lake Tanganyika; and in hollows due to minor crustal movements, such as the Thirngat in the Garo Hills of India, formed by the earthquake of 1897. Some small lakes are the outcome of glacial erosion. Lakes may be formed by the dissolving of soluble rocks by water, as Lough Mask. Lakes may be due to more than one of these causes, such as the Great Lakes of North America, which are partly tectonic and partly glacial.

Most lakes are gradually being silted up by waste brought into them by rivers, and those which have an outlet are being lowered as the river erodes its bed. Plants grow round their edges, and their remains also accumulate. As the lake grows shallower this vegetation spreads, until it covers the whole area, and forms first a marsh, and ultimately solid land. Sphagnum moss is one of the most important of marsh plants, and where it predominates the marshes are called peat bogs.

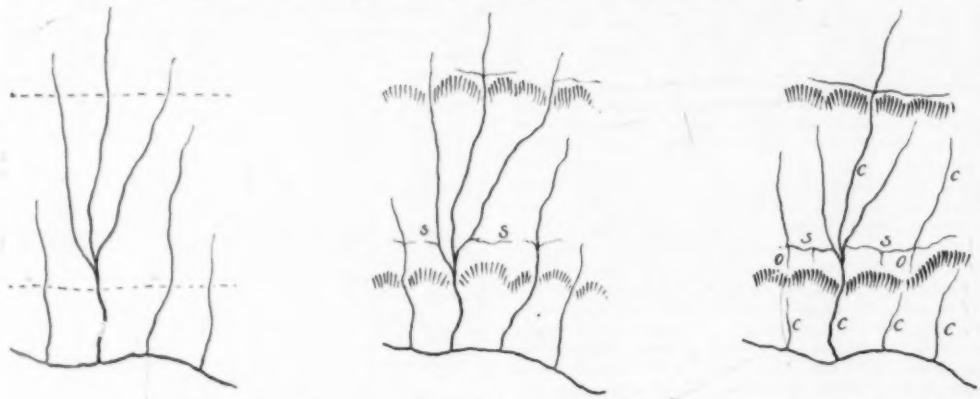



Fig. 1. Fig. 2. Fig. 3.

Stages in the Formation of an Adjusted River System.—(*After W. M. Davis.*)

The dotted lines in the first figure represent the underlying harder layers not yet exposed, which form the escarpments in the second and third figures. *c* = consequent; *s* = subsequent; *o* = obsequent.

**Forms of the Coastal Belt.**—The general curvature of the land can be traced under the sea; but along and on either side of the strand or shore line, the line where land and sea meet, there is a nick in the curve, which is steeper above, flatter below water. This is the coastal belt, or simply coast, whose general trend is indicated on our maps by the strand or shore line.

The minor irregularities in the coastal belt are due to the nature of the rocks and the action of waves and currents. The larger forms are determined by vertical movements of the strand, due either to local crustal movements, or more frequently to crustal movements which raise or lower the level of the sea as a whole over wide areas. If the sea-level rises, we speak of a sunken coast; if it falls, of a raised coast. The forms of sunken coasts obviously depend on the surface forms of the drowned land, and those of the raised coast on the forms of the ocean floor. The sunken coasts are irregular and rugged in mountainous lands and flat in plain lands; the raised coasts are usually smooth and flat. The action of waves and currents may form cliffs in a flat land, and a flat, sandy strand along a rugged land. Waves may act on the land to sixty feet below the surface, and currents parallel to the coast probably erode it as deep as three hundred feet.

A regular coast bounded by cliffs is a cliff coast, such as that of Sussex or Normandy.

If the coast in a submerged mountain-land is parallel to

the axis of folding or fracture, it is called concordant or longitudinal, and is usually steep and regular. Should the sea pass across the first range in some transverse valley, it fills the inner longitudinal valley on both sides, making T gulfs.

In discordant or transverse coasts the sea fills the lower valleys, making bays; while the ridges jut out as peninsulas, ending in promontories between them, and may form one or more islands rising beyond the promontory, separated by straits from the mainland and from each other.

This is sometimes known as a ria coast, and is characterised by well-marked valleys, widening and deepening towards their mouths. Typical rias are those of North-western Spain or South-western Ireland.

It is intermediate between the discordant coasts, where the valleys are still young and form inlets in a somewhat regular coast, and where the valleys have been so widened that only irregular incurves and outcurves occur, but beyond them many rounded islands. This latter coast is found east of Sweden, where the islands form the *skjaergaard*, and we may term it a skerry coast.

Islands with well-marked axes parallel to the coast may fringe a concordant coast cut by T gulfs, the channels being parallel or at right angles, and of approximately equal widths, as in Dalmatia, and this variety may be called a channelled coast.

Rivers debouch on the coasts of drowned mountain-lands by estuaries, scoured twice daily by the tide, the strand-line being indicated by the outer sand-bar which often forms at their mouths.

On an alluvial coast, whether fluvial or marine, the sea is usually fringed with sand-dunes. Cross and double-cross inlets are formed where the water breaks through the first, or first and second line of dunes. If this land is slightly drowned, a line of sandy islands indicates the old ridges of the dunes, and a chain of lagoons the old dune furrows, as in the Frisian Islands and Watten.

Rivers may form estuaries in this coast. If the land rises, the rivers form deltas. The currents sweeping parallel to a sandy coast carry much waste, and this may gather on the lee side of a promontory, in a gradually extending spit or hook of sand, which bounds a horned bay. Currents flowing perpendicularly to the coast form beaches, which move slowly landward as the sea-bottom is eroded; and if there are any eddies, they may condition the cusp-shaped marine forelands, such as Dungeness.

In submerged regions which have been glaciated, the drowned valleys do not form true rias; for they are more uniform in breadth, and are irregular in their beds—usually shallow at the mouth over a terminal moraine, and with a number of deep basins within. This is a fiord. Norway, Western Scotland, British Columbia, Chile, and Southern New Zealand have fiord coasts, which may occur in either concordant or discordant coasts. The morainic islands separated by sounds of a submerged flat land form a skerry coast.

Accumulations of coral form reefs along certain coasts, which may fringe the land (fringing reefs), or form a barrier outside it (barrier reefs), broken only opposite the river mouths, owing to the freshening of the waters, which prevents the growth of the corals. Where a coral reef forms a more or less ring or oval shaped coast, enclosing no land, it is an atoll.

**Islands.**—An island is a mass of land completely surrounded by water.

The great land masses of the world are continent-islands, and are distinguished from many others only by size, the smallest receiving that name—Australia—being four times as large as Greenland, the next island in area. Other islands, which possess the same complex rock structure as the continent-islands to which they are adjacent, are relic or separated continental islands.

Other islands are volcanic or coralline, or both. They are due to gradual elevation above the waves—in the first case, of material from the earth's interior; in the second case, from the agglomeration, by currents, waves, and winds, of the coral skeletons grown near the surface of the ocean.

Coral islands, in many cases, are formed in a gradually rising region, as old raised sea-beaches are found on them. Some may be constructed on sinking land. Probably no simple explanation suffices, and in the case of the larger islands complex movements have certainly taken place.

The term continental island is sometimes used to distinguish islands rising above the continental shelf from oceanic islands. This would make New Zealand an oceanic island. If islands are to be classified according to the part of the crust over which they rise, they should be divided into islands of the shelf, of the slope, and of the abyssal plateau. It is useful, however, from a biological point of view, to distinguish volcanic and coralline islands rising near the continents from others farther removed from continental influences, and the latter may be termed oceanic volcanic or coralline islands, or oceanic accumulation islands.

The separated or relic islands may be grouped according to their shape and structure. The Great Antilles and the Sunda Islands are long tectonic mountain islands; Newfoundland, a denudation mountain island; Sokotra or Madagascar, a long table-land island; the islands of the Baltic, plain-land islands.

Islands may also be grouped according as they are isolated, such as Iceland; or arranged in chains, such as those of Japan and the other island wreaths of the Western and Northern Pacific; or in archipelagoes, such as those in the Ægean.

# A COURSE OF OBJECT LESSONS FOR GIRLS' SCHOOLS.

BY WILLIAM DONE, B.A.,
*Head-Master of Brighton Pupil Teachers' School.*

## XII. SUGAR.

*Articles of Illustration.*—Lumps of white sugar, some brown sugar, treacle, sugar candy, pieces of sugar cane and a sugar beetroot (not the red beet used in salad), water, glass vessels, spirit-lamp, patty-pans, a few drops of concentrated sulphuric acid.

| Experiment and Observation. | Result or Inference. |
|---|---|
| Each of the girls to have a piece of white lump sugar, and examine it with regard to appearance, hardness, etc. | The lump of sugar is white and sparkling. It is too hard to break between one's fingers. |
| The teacher to pound up a few lumps of sugar, and also to crush some pieces of the school chalk; the girls to take a pinch of each in either hand and rub between the fingers. | The pounded substances do not feel alike. The sugar feels hard and granular, while the chalk feels smooth. |
| The children to look closely at the shape of the grains, also at the shape of the grains in some Demerara brown sugar. | The grains have very much the same shape, and from a previous lesson we know that a substance having a definite uniform shape for its particles is said to be crystalline. |
| The teacher to show the piece of sugar candy. | The crystals here are much larger, and their shape can therefore be better noticed. The crystals resemble cubes. |
| Some sugar to be mixed in cold water until no more will dissolve. | Sugar is very soluble in cold water. |
| The same amount of water having been previously heated, sugar equal to that used before is dissolved in it; then more is added, until saturation point is reached. | Hot water dissolves more sugar than cold water, but finally we have obtained a saturated solution. |
| Suspend a piece of thread in the saturated solution, and set it aside to cool, and to be examined at some other time. | From a previous lesson on "Matters in Solution," a deposit of crystals would be expected as the solution cools. [Teacher to confirm this, also to show the sugar candy as a sample of what may be looked for.] |

| Experiment and Observation. | Result or Inference. |
|---|---|
| Some sugar to be placed in a patty-pan over the spirit-lamp. | The sugar melts, turns dark, gives off a characteristic smell, and finally becomes a black, porous mass. |
| A small quantity of sugar to be placed in a test-tube or other thin glass receptacle; a few drops of sulphuric acid to be poured on the sugar.<br>The chemical action may be accelerated by gently warming the mixture. | The sugar becomes black, as before.<br>The change of the sugar into a spongy black mass is very rapid. |
| Pieces of the black substance to be handed round the class, that they may be examined and tasted. | The black stuff looks something like coke, and has no longer the taste of sugar. [Teacher to say that sugar is composed of carbon and water. The heat or the sulphuric acid drove out the water, and left only carbon behind.] |

*Additional hints for a subsequent lesson:—*

1. *Cane Sugar.*—Show a piece of sugar cane and a picture of a sugar plantation. It is a tropical plant, flourishing best between 35° north and south latitudes. Measure the diameter of the piece of sugar cane. The average measurement is two inches. From the surrounding objects in the picture deduce that the canes grow about twice as high as a man. The leaves are long, narrow, and drooping. The appearance of the whole plant leads us to the conclusion that it belongs to the family of grasses. Notice the plume-like head of whitish flowers. Compare with the appearance of the maize plant. Ask for the names of countries which produce sugar canes—West Indies, South United States, Mauritius, Brazil, etc.

*How the Sugar is got from the Canes.*—The canes are cut into convenient lengths and crushed between heavy rollers. This presses out the juice. The juice is boiled down and clarified. The concentrated syrup, placed in shallow vessels to cool, is stirred about until the sugar crystallises out, leaving behind the molasses or treacle. To obtain white sugar, the raw or brown sugar must be reboiled, and purified with charcoal, lime, or white of eggs.

2. *Sugar from Beetroot.*—Show a beetroot, cut it up in pieces, and let the girls taste it. Note any differences in the appearances and tastes of cane sugar and beet sugar. Tell the children the reason so much beet sugar is used in England.

3. *Glucose.*—In a previous lesson on starch, we found that a piece of starch placed in the mouth and moistened by the saliva took a sweetish taste and became grape sugar. This grape sugar, or glucose, may also be obtained by treating starch with sulphuric acid, and is much used in brewing.

## XIII. SALT.

*Articles of Illustration.*—A lump of cooking salt, a pennyworth of rock salt, a funnel, two glasses, spirit-lamp, small tin dish, an empty matchbox.

| Experiment and Observation. | Result or Inference. |
|---|---|
| Let the girls take each a piece of lump sugar and a similar piece of cooking salt. Contrast their chief characteristics. | Both substances are crystalline. Each has a characteristic taste. The piece of sugar is harder to break than the salt. |
| Hold a few grains of salt on a knife-blade in the flame of the spirit-lamp. | Salt colours a flame a bright yellow. |
| Take a glass of water; ask one of the girls to taste it. Place a pinch of salt in the water, and stir until the salt is dissolved. | Salt, like sugar, is readily soluble in water. [Teacher to give the term—*saline solution.*] |
| Refer to the strong solution of salt used for salting meat, etc. | A very strong solution of salt is called brine. Salt is a preservative for meat. |
| Show a piece of rock salt. Note its colour. Break it in pieces with a hammer. Hand the pieces round the class for examination. | The rock salt in the mass has a dirty brownish appearance. It is somewhat hard to break, but when it does so, it breaks in definite directions. The pieces are cubical in shape, and the clean crystals are very transparent. The colouring matter is more or less in patches, and is evidently some extraneous impurity. |
| Dissolve some pieces of rock salt in water. Stir the liquid, and filter. | The dissolved salt runs through the filter quite clear, leaving a dirty stain on the filter-paper—thus confirming our previous opinion.<br>From the lesson on "Matters in Suspension" we learned that these substances would slowly settle at the bottom, if the liquid in which they were floating were allowed to stand long enough. |
| Suppose we were dealing with salt on a large scale, when it would not be practicable to filter the dissolved rock salt, would any other method suffice? | The salt can be recovered from the solution by evaporation, and is then white and crystalline like ordinary cooking salt. |
| Set the clear filtrate over the spirit-lamp to evaporate. Show a similar result which has been obtained previous to the lesson. | Salt absorbs moisture from the air very readily. |
| Refer to the appearance of the salt in the salt-cellar on a very wet day, if it is exposed to the air for some time. | |
| Refer to the habit of flavouring our food with salt, also to the partiality of animals to salt. | Salt improves the taste of much of our food. It is indispensable for the healthy condition of the blood. |
| Weigh out about one ounce of salt, and state that this is the average amount an adult requires in a day. | We do not take all this amount direct from the salt-cellar, but most of it is used in preparing our food. |

*Additional Information.*—Obtain from the class the names of places in England from whence salt is obtained, such as Cheshire and Worcestershire. Sketch out the process. The rock salt is dissolved in water, and the suspended impurities allowed to settle. The clear solution is transferred to shallow pans, and evaporated by heating from beneath. The salt left behind is scooped out in a wet mass, and placed in oblong wooden boxes. [Illustrate this by placing wet salt in a matchbox, and standing it aside to dry for a few days.] These boxes have holes in them to allow the water to drain off, and so facilitate the drying of the salt, which becomes a hard cake, and takes the shape of the box containing it. Such oblong lumps of salt we see in the shops.

# HOW TO COMPILE NOTES OF LESSONS.

By T. Hudson, *Head-Master of Kepler Board School, Leeds.*

## II.—A READING LESSON.

The method of taking a reading lesson must necessarily vary with the age of the scholars, and the conditions under which the lesson is to be given. In lower classes more pattern and simultaneous reading will be needed than in the upper classes, and the notes must therefore be made to suit the standard. Then, too, in some schools several classes must be taught at the same time in one large room. Under such circumstances it might be very inconvenient to take simultaneous reading, even if it were deemed advisable. The tendency of present-day methods, even when the rooms are convenient, is to do less simultaneous and more individual work. The following notes are therefore arranged for a lesson without simultaneous reading.

In writing notes of a reading lesson, care must be taken to arrange them for *a particular lesson.* They should not be simply a plan of taking reading lessons in general copied out of a school management book. If any paragraph in the selected lesson presents special difficulty, it should be indicated in the notes, with the method of treating it. The

***Next month: Lessons and Blackboard Sketches on "Air Pressure, and Barometer."***

words which the teacher intends to explain, together with the meanings to be given, should also appear in the notes.

The guiding principle in writing the notes and giving the lesson should be that the scholars must understand what they are reading about, or how can they read with intelligence and natural expression? If the paragraph is a difficult one, the teacher must read it through to give a general idea of its meaning; but if easy, some good reader who can look ahead and grasp the meaning might read it. If there are words or phrases needing explanation, the explanation should be given immediately after reading the paragraph through the first time, and should not be confined to a few minutes at the end of the lesson. Give the explanations as briefly as possible, and do not err in taking up so much time with meanings that very little individual reading can be done.

### PLAN OF A READING LESSON.

*Standard III.*
*Time—40 minutes.*
*Subject-matter.*—"Obeying Orders," *Royal Crown III.*, p. 108.

| | |
|---|---|
| *Preliminary.* | Books to be at end of desks, ready to be passed on. Open at word of command. Hold about two feet from the eyes, at an angle of about 40°. |
| *Pattern.* | Par. 1. As this paragraph is rather hard, the teacher will read it with proper emphasis and expression. This will give the children a general idea of the meaning. But, in order to read it with intelligence, the scholars must know the meanings of the following words:— |
| *Meanings.* | Labourer: A man who works on a farm, etc.<br>Industrious: Hard-working.<br>Frugal: Careful of his money.<br>Sober: Did not get drunk.<br>Paris: Chief town in France. (Compare London.) |
| *Individual.* | Call upon a sharper scholar to read the paragraph, and then a poor reader. |
| *Correction of Errors.* | Not many mistakes are anticipated here beyond the probable tendency to drop the voice at Paris, and hurrying over words the children recognise till they come to one with which they are not familiar, when a pause would be made, as in "a well-kept garden covered with.....creeping plants;" "made a feast in.....honour of the.....occasion." This is the result of reading with the eye and not with the intelligence. Such mistakes must be *at once* remedied. Little errors of pronunciation, etc., should be left till the boy has finished. Let scholars *then* show hands for mistakes, not while the boy is reading. |
| *Silent Reading.* | Par. 2. As no great difficulty is presented in this paragraph, let the scholars have between one and two minutes to read it through silently. Ask a few questions upon it, and then call, as before, upon individuals.<br>Proceed in a similar way throughout the lesson. |

## CRITICISM COMPETITION.

We give in next column a copy of notes of a badly-arranged dictation lesson, taken from a pupil teacher's Notes of Lesson book.

We offer a prize of Half a Guinea for the best criticism of this lesson. The "Criticism" should be accompanied by the coupon from the current number of The Practical Teacher, and should reach our office not later than November 30, addressed as follows:—

*CRITICISM COMPETITION.*

Editor of "The Practical Teacher,"

T. Nelson and Sons,

35 & 36 Paternoster Row, London, E.C.

A pseudonym should be adopted, and the name and address of the competitor written on a separate piece of paper.

A properly-arranged dictation lesson, with remarks on the one now given, will appear in our columns when the award is made.

### NOTES OF A DICTATION LESSON.

*Standard III.*
*Time—25 minutes.*

1. **Preliminary.**—(1) See that each child is supplied with pens and paper. (2) Have the difficult words underlined in a piece of dictation written on B.B.—*e.g.*, Sancho, ordered, broken, dropped, pieces, people, amazed, judge.

2. Before letting children spell the words on the B.B., read the piece of dictation, and comment on the meanings of difficult words.

3. Next let children spell each word three times; but before doing so, if there is any spelling rule connected with the word, revise it with the children—*e.g.*, in pieces. **Rule.**—Always *i* before *e*, except after *c*. And in *dropped*. When a word ends in a consonant, the consonant should be doubled if a vowel precedes it and follows it when *ed* is added.

4. Clean the B.B., and prepare children for writing, paying attention to pens, writing, and position.

**Dictation.**—*Sancho* | then *ordered* | the cane to be *broken*, | and when | this was done | out *dropped* | ten *pieces* of gold. | Then all the *people* | were *amazed*, | and began | to think | that their *judge* | was a wise man | after all. |

5. When all are in readiness, begin giving the piece out, and stop at the places indicated, speaking in a clear, distinct voice, and saying it slowly.

6. When the piece is finished, let children dry books and prepare for correcting.

7. Spell each word slowly, and let children correct their own books. If wrong, a dash must be put under the word. Let scholars put the number of mistakes in the margin.

8. Take the number of children correct, with one mistake, and so on.

## THE INSPECTOR'S NOTEBOOK.

BY AN INSPECTOR OF SCHOOLS.

**The new Certificate Regulations.** All those who are intending to sit for the forthcoming Certificate Examinations should read very carefully the article in last month's issue dealing with the new regulations issued for the training colleges. I advise all acting-teacher candidates to write to the Board of Education for copies of these new regulations.

**The Evening Schools, Session 1901-2.** After all the hubbub respecting the evening schools, I believe it will be found that about the same number will be opened this session as last. There will be fewer admissions, but less leakage, so that there should be a gain in efficiency. It is surprising how amicably the local bodies are working together in this matter. In England, happily, as soon as a measure has become law, all recognise the futility of further fighting; the axe is buried, and both sides get to work to administer.

**Staffing of Schools.** As a rule, of course, the Voluntary school is not staffed so well as the Board school. Teachers in the former sometimes tell me they have some trouble in showing to certain managers the difficulty of working schools upon the Code minimum as shown in Article 73. It should be pointed out that the requirements as laid down in Article 73 are the lowest the Board can permit without fining the school. As a matter of fact, it is often impossible to conduct a school unless a more liberal staff be allowed. The small print of Article 73 applies; and although the total staff may cover the average attendance, nevertheless should one teacher in the school have charge of more than 15 per cent. above her allowed number, then the article is infringed. Happily it is not a common occurrence to find the staff down to the bare limit of Article 73. Touching upon this point there is a valuable note in the Revised Instructions recently issued:—

"Article 73 specifies the minimum staff that can be employed in a school in order that the full grant may be paid under Article 108. It does not follow that this staff is in all cases sufficient. The special circumstances of the school may

require a more numerous staff, or more teachers of high qualifications."

Pupil teachers are now often ignored for purposes of Article 73 in Board schools. This is a wise plan, because nowadays the pupil teachers have to be absent for study a considerable portion of their time. Nevertheless it is well to saddle them with a little responsibility. This may be effected by allowing them to teach certain subjects, and to be responsible for the results in these subjects.

---

### The "Notebook" Query Column.

At the suggestion of the Editor, I am in future devoting more consideration to this portion of my monthly notes. It is thought that the several changes in the Code, and the alterations in the regulations of teachers' examinations, will give rise to extra correspondence.

I take this opportunity of inviting readers to seek my counsel on any subject coming within the purview of schoolcraft. Please oblige by writing your queries in concise language, as I purpose referring to the question to which I give an answer. Only urgent letters can be replied to by post, and then the writer must enclose a stamped addressed envelope and one stamp in addition.

Letters should be addressed:—Inspector's Notebook Query Column, care of the Editor Practical Teacher.

*D.* asks whether a second-class science counts at the Certificate Examination; and if so, what marks are obtainable for it. She also wants to know whether she must sit for the advanced stage of the same subject for second year, or can she take the elementary stage again.

I should say proportionate marks would be allowed. There are 75 obtainable for an elementary, but that would be the maximum. I have no means of knowing whether the *actual* marks are obtained.

"A candidate who in her first year's examination has been credited with marks for a *first* class in either stage of a subject may not obtain marks for the same stage of that subject in her second year's examination." You did not obtain a first.

*W.E.G.* obtained only (ii.) and (iii.) in the Second Year Certificate Examination. He intended sitting last July, obtained permission to do so from the Board of Education, but failed to present himself. He now asks:—

1. Can I take the examination next year?

2. If I take part (ii.)—in which I got a third—and raise it, shall I then qualify to take pupil teachers?

3. If I take both parts, and succeed in raising them, say, to two firsts, will such be stated on my parchment if returned for correction? or will it simply be stated, without particulars, that I am now qualified to superintend pupil teachers?

1. Yes; but you must first obtain permission from the Board of Education.

2. Yes.

3. You would be very unlikely to obtain a double first. I advise you not to try. I have not seen a parchment lately, but should think it would merely state that you were now qualified to take pupil teachers. If, however, the particulars are already given, then I should certainly say the new particulars would be given.

*J.C.* is head of a boys' Board school. He is shortly to take over the girls, when the department will be a mixed one, with the following staff: head-master, certificated (female) assistant, male ex-pupil teacher, pupil teacher (first year female). His average will be about 150. He asks for advice as to arrangement of staff and time-table. He makes the suggestion that I shall occasionally give rough drafts of time-tables in my notes.

I am much obliged for the suggestion. I will endeavour to meet it. I must preface my answer by saying that it is difficult to help in staff arrangement without knowing all the circumstances. In the first place, I should say that the staff might very well be stronger. Leaving out the girl pupil teacher, my correspondent is staffed at the minimum. Really another ex-pupil teacher is wanted. Perhaps J.C. will be able to persuade his Board to give him one. However, assuming the staff to be as stated, and also that the certificated assistant is superior to the ex-pupil teacher, then I suggest:—Standards I. and II., certificated assistant; III. and IV., male ex-pupil teacher; V., VI., VII., head and pupil teacher.

J.C. does not give me the numbers in each standard. He must take care Article 73 is not infringed. As an alternative, on the assumption that the ex-pupil teacher is a good one, then possibly the following might do:—I. and II. as above; III., pupil teacher; IV., head; V., VI., VII., ex-pupil teacher. So much depends upon the capacity of each teacher generally, though it is advisable to put a good female assistant at the lower standards.

Now we will deal with the physical drill and needlework, and speak first of the latter. Time per week not more than three hours; perhaps two and a half hours will do. You had better take Standards I., II., III. at one time, and the rest at another; and you should divide the two and a half hours into two lessons. Take one whole morning, say on Tuesday; and one whole afternoon, say on Thursday. Arrange so:—

Tuesday: 9.30–10.30, Standards I., II., III.
10.45–12, Standards IV.–VII.
Thursday: 2–3, Standards I., II., III.
3.10–4.30, Standards IV.–VII.

If you prefer more time—say three hours—then you must devote another afternoon to this work, and I should then take it on Monday, Wednesday, and Friday, in the afternoons, so—

2.15–3.15, Standards I., II., III. (Monday and Friday).
3.25–4.25, Standards IV.–VII. (Monday and Friday).
2.15–3.15, Standards IV.–VII. (Wednesday).
3.25–4.25, Standards I., II., III. (Wednesday).

Let the needlework be taken by the certificated assistant, assisted by the pupil teacher.

For physical drill I should group Standards I. and II.; III. and IV.; V., VI., VII. Let the certificated assistant take I. and II., the ex-pupil teacher III. and IV., and you take V., VI., VII. I should say three lessons of twenty minutes for the lower sections and two half-hour lessons for the top section would be best.

---

## ARITHMETIC TESTS.

### Standard III.

---

#### Card 1.

1. Divide ten thousand and ten by thirty-seven.

2. Find the sum of three hundred and sixty pounds, fourteen shillings, and tenpence farthing; five thousand eight hundred and nine pounds, seven shillings, and elevenpence; seven hundred and forty-eight pounds, eighteen shillings, and fivepence halfpenny; eight thousand and seventy-five pounds, ten shillings, and ninepence; six pounds, thirteen shillings, and eightpence three-farthings; and thirty-eight pounds, fifteen shillings, and threepence.

3. A shopkeeper bought some goods for £47, 16s. 9d., and paid 15s. 11d. for carriage. He sold them for £63, 10s. 6d. How much did he gain?

#### Card 2.

1. Find the difference between four thousand seven hundred and sixty-eight pounds, twelve shillings, and sixpence three-farthings and five thousand and forty-seven pounds, ten shillings, and threepence three-farthings.

2. £6078, 19s. 5¼d. + £92, 14s. 7½d. + £813, 12s. 11¾d. + £7060, 16s. 9d. + £37, 17s. 10½d. + £954, 10s. 8¾d.

3. Divide three thousand marbles among forty-six boys. How many more are wanted to give them another one each?

#### Card 3.

1. How often can three hundred and fifty-eight be subtracted from ninety-eight thousand four hundred and fifty?

2. What must be added to nine thousand seven hundred and eight pounds, fourteen shillings, and tenpence farthing to make twenty thousand pounds?

3. A man bought a coat for £1, 10s., a pair of trousers for half as much, and a vest for half the price of the trousers. What was the amount of the bill?

CARD 4.

1. What is the sum of eight hundred and seven pounds, thirteen shillings, and sevenpence farthing; sixty-three pounds, fifteen shillings, and tenpence; four thousand and eight pounds, six shillings, and fivepence halfpenny; two hundred and seventy pounds, eighteen shillings, and sixpence three-farthings; seven thousand one hundred and fifty-two pounds, eleven shillings, and elevenpence halfpenny; and eighty-one pounds, seven shillings, and eightpence three-farthings?
2. If you multiply two numbers together, the product is 7031. One number is 79; what is the other number?
3. A horse and three cows cost one hundred pounds. The horse cost £47, 13s. 10d. How much more did the cows cost than the horse?

CARD 5.

1. Take seven thousand two hundred and four pounds, fourteen shillings, and sixpence halfpenny from ten thousand and three pounds, nine shillings, and fivepence farthing.
2. 349830 ÷ 69.
3. If I had 28 sovereigns, 28 shillings, and 28 pence, and had to pay thirty guineas, how much money should I want?

CARD 6.

1. Find the amount of £75, 14s. 3½d.; 18s. 5½d.; £609, 17s. 6½d.; £5420, 9s. 9½d.; 15s. 10½d.; and £7086, 13s. 8½d.
2. How many times is two hundred and thirty-four contained in one hundred and seventy-five thousand five hundred?
3. I spent 19s. 6d. in eggs at 18 for a shilling. How many eggs did I get?

CARD 7.

1. From £8035, 17s. 11¼d. take £7048, 18s. 10¾d.
2. Add together six thousand and three pounds, fifteen shillings, and fourpence halfpenny; four hundred and ten pounds, twelve shillings, and tenpence farthing; eight pounds, seventeen shillings, and sixpence three-farthings; fifty thousand three hundred and seventeen pounds, four shillings, and ninepence; one hundred and sixty-five pounds, eighteen shillings, and sevenpence three-farthings; and seven thousand and twenty pounds, six shillings, and tenpence.
3. Three thousand and seventy-four nuts were divided equally among 26 boys and 27 girls. How many did each child get?

CARD 8.

1. What is the result if six hundred and eight thousand and forty-seven be divided by four hundred and twenty-seven?
2. What is left when £6085, 14s. 7½d. is taken from ten thousand pounds and a penny farthing?
3. A farmer went to market with £157, 15s. 3d. He bought a horse for £38, 10s., a cow for £19, 5s., and some sheep for £86, 19s. 6d. How much had he left?

CARD 9.

1. £246, 13s. 5¼d. + £6083, 17s. 8¾d. + £140015, 16s. 10¾d. + £37, 4s. 2¼d. + £7, 15s. 6¾d. + £17850, 11s. 11¼d.
2. Subtract nineteen pounds and tenpence farthing from six hundred and four pounds and fivepence three-farthings.
3. A train makes a journey of 611 miles at 47 miles an hour. It stops six times at stations, and five minutes each time. How long does the journey take?

CARD 10.

1. What is the nineteenth part of the product of 323 and 46?
2. Find the sum of sixty-five thousand and eighteen pounds, fourteen shillings, and fivepence halfpenny; eight thousand seven hundred and six pounds, three shillings, and eightpence farthing; fourteen thousand and three pounds, seventeen shillings, and tenpence three-farthings; five hundred and twenty-nine pounds, six shillings, and twopence farthing; and thirty thousand and seven pounds, eleven shillings, and elevenpence halfpenny.
3. A man started business with £786, 10s. The first year he lost £59, 15s. 6d., but the second year he gained £247, 18s. 9d. How much was he then worth?

CARD 11.

1. What is the remainder when thirty thousand and twenty-five is divided by fifty-eight?
2. What is the difference between forty thousand one hundred and seven pounds, fourteen shillings, and sevenpence halfpenny and thirty-four thousand and eighty-nine pounds, eighteen shillings, and tenpence farthing?
3. A farmer had ten guineas. He bought two sheep at £3, 15s. each. How much had he left?

CARD 12.

1. £48, 13s. 7¾d. + £281, 17s. 10½d. + £5, 6s. 3¼d. + £36017, 14s. 8¾d. + £7820, 8s. 6½d. + £50639, 18s. 11d.
2. Take thirty-nine thousand nine hundred and ninety-nine pounds, sixteen shillings, and ninepence three-farthings from forty thousand pounds, thirteen shillings, and eightpence farthing.
3. How many words are there in a book of 176 pages, if each page contains 24 lines, and each line 17 words?

CARD 13.

1. What is the one hundred and fifty-sixth part of three hundred and fifty-seven thousand two hundred and forty?
2. £60013, 5s. 4¾d. – £846, 15s. 6½d.
3. A man bought a horse for £39, 17s. 6d., and a carriage for £18, 16s. 9d. more than for the horse. What did he pay for both?

CARD 14.

1. Three hundred and ninety pounds, eighteen shillings, and sevenpence farthing + £8016, 13s. 9½d. + nine hundred and five pounds, fifteen shillings, and elevenpence three-farthings + £47, 18s. 6½d. + five thousand and three pounds, eleven shillings, and three-halfpence + £8, 19s. 3½d.
2. What must you subtract from £3605, 14s. 5¾d. to leave £2718, 16s. 9½d.?
3. A fruiterer sold 1922 lemons. He sold 37 to one person, and 29 each to the others. How many buyers were there?

CARD 15.

1. Take eight thousand and seventeen pounds and tenpence three-farthings from ten thousand and one pounds, sixteen shillings, and a halfpenny.
2. £18330 has to be divided equally amongst 39 persons. How much should each receive?
3. Find the value of three crowns, five half-crowns, seven florins, nine sixpences, and eleven threepenny pieces.

CARD 16.

1. Add together two hundred and forty-eight pounds, thirteen shillings, and sevenpence three-farthings; one thousand and sixty-five pounds, sixteen shillings, and ninepence halfpenny; twenty-six thousand eight hundred and seven pounds, nineteen shillings, and tenpence farthing; fifteen shillings and eightpence three-farthings; eighty-six pounds, fourteen shillings, and twopence; and five thousand and three pounds, eight shillings, and fourpence farthing.
2. From £20403, 16s. 9½d. take £7019, 17s. 11½d.
3. Each of nine boxes contained six hundred oranges. These were equally divided among twelve schools. If there were one hundred and fifty scholars in each school, how many oranges would each child receive?

CARD 17.

1. Divide half a million by six hundred and ninety-seven.
2. Find the difference between seven thousand four hundred and six pounds, ten shillings, and fivepence three-farthings and eight thousand two hundred and five pounds, sixteen shillings, and three-halfpence.
3. A man started on a journey with a five-pound note. He travelled 160 miles each way at a penny a mile, and spent £2, 17s. 6d. besides. How much had he at the end of his trip?

CARD 18.

1. £9762, 12s. 3¾d. + £60, 4s. 11½d. + £8, 18s. 7¾d. + £24, 5s. 10½d. + £3907, 19s. 8¾d. + £826, 6s. 5½d. + £4058, 17s. 9½d.
2. What must be added to sixty-nine thousand and thirty-eight pounds, eighteen shillings, and ninepence three-farthings to make seventy thousand and thirty pounds, fourteen shillings, and sevenpence farthing?
3. If the quotient is 496, the divisor 74, and the remainder 56, what is the dividend?

CARD 19.

1. Divide 323 dozen by 17.
2. Take eighty-seven pounds, eight shillings, and sevenpence halfpenny from one hundred guineas.
3. A gentleman had £36, 15s. 9d. in his purse. He paid £18, 17s. 10d., and received £5, 12s. 7d. How much had he then?

CARD 20.

1. £5904, 17s. 5¾d. – £4896, 18s. 9½d.

2. What is the sum of six thousand and seventeen pounds, twelve shillings, and fourpence three-farthings; one hundred and four pounds, seven shillings, and eightpence; sixteen thousand three hundred and eight pounds, ten shillings, and ninepence halfpenny; two hundred and sixteen pounds, five shillings, and a penny; forty pounds, nineteen shillings, and sixpence farthing; and seventy thousand and five pounds, fourteen shillings, and tenpence three-farthings?

3. If a bird can fly at the rate of 54 miles an hour, how long would it take to fly 810 miles, if it rested two hours on its journey?

CARD 21.

1. Divide one hundred and twenty-seven thousand four hundred by two hundred and sixty.

2. Two sums of money amount to £12603, 12s. 10½d. One sum was £5084, 17s. 11¾d. Find the other sum.

3. A boy has a crown, a shilling, and a sixpence. If he buys two bobks at 1s. 9d. each, how much has he left?

CARD 22.

1. Add together £46, 15s. 9½d.; £6078, 14s. 10½d.; £9, 7s. 8½d.; £890, 18s. 11¾d.; £29013, 16s. 7½d.; and £7935, 19s. 6½d.

2. What is the difference between three thousand eight hundred and ninety-seven pounds, ten shillings, and sevenpence three-farthings and four thousand six hundred and three pounds and sixpence halfpenny?

3. The divisor is 357, the dividend 167100, and the remainder 24. Find the quotient.

CARD 23.

1. Take eight hundred and ninety pounds, seven shillings, and sixpence farthing from one thousand four hundred and six pounds, six shillings, and threepence.

2. What is the four hundred and ninth part of two hundred and twenty-nine thousand and forty?

3. A gentleman had two pounds. He gave a penny to each of seventy boys, and twopence to each of fifty girls. What had he left?

CARD 24.

1. Find the sum of four thousand five hundred and sixty-seven pounds, eighteen shillings, and ninepence farthing; eight hundred and twenty pounds, fourteen shillings, and sevenpence halfpenny; six hundred and ninety thousand and eighty-five pounds, thirteen shillings, and tenpence three-farthings; forty-nine pounds, seven shillings, and eightpence; eight pounds, nineteen shillings, and fourpence halfpenny; and nineteen thousand six hundred and four pounds, eighteen shillings, and elevenpence farthing.

2. From ten thousand pounds take nine thousand and seventeen pounds, three shillings, and tenpence three-farthings.

3. A dealer sold nine dozen sheep to each of four persons, and had 345 left. How many sheep had he at first?

CARD 25.

1. What number multiplied by forty-eight gives a product of two hundred and ninety-two thousand five hundred and sixty?

2. How much less is eight thousand nine hundred and sixty-seven pounds, fourteen shillings, and three-farthings than thirteen thousand pounds and a halfpenny?

3. A clerk copied 9s. 8d. for £9, 8s., and £5, 7s. for 5s. 7d. What was the amount of error for both sums?

CARD 26.

1. What is the sum of £508, 14s. 10½d.; £19, 11s. 6¾d.; £860, 8s. 11½d.; £7, 19s. 8d.; £53, 17s. 9¾d.; and 13s. 7½d.?

2. How many parcels, each weighing eighty-four pounds, can be made out of 593796 pounds?

3. John had a sovereign, and Fred had half a guinea. After John had spent 15s. 9d., how much more had Fred than John?

CARD 27.

1. What is the difference between 796 dozen and 658 score?

2. From seven thousand and three pounds, sixteen shillings, and fourpence take nine pounds, eleven shillings, and eightpence halfpenny.

3. A horse, cart, and harness cost £58, 15s. The horse cost £37, 10s., and the cart 18 guineas; what was the value of the harness?

CARD 28.

1. Divide a quarter of a million by seventy-four.

2. Add together ninepence three-farthings; fifteen shillings and tenpence farthing; eight pounds, eleven shillings, and eightpence halfpenny; fifty-four pounds, seventeen shillings, and sixpence three-farthings; eight hundred and seventeen pounds, fourteen shillings, and elevenpence halfpenny; and three thousand seven hundred and two pounds, nineteen shillings, and ninepence.

3. Two men and a woman earned six pounds for wages. Each man earned £2, 5s. 9d. How much did the woman earn?

CARD 29.

1. Take nine pounds, seventeen shillings, and a halfpenny from five hundred and sixteen pounds, twelve shillings, and eightpence farthing.

2. Find the product of eight hundred and seventy-nine and six hundred and seven, and prove your answer.

3. How many wagonettes, each holding 34, will be required for 597 girls and 389 boys?

CARD 30.

1. Divide three-quarters of a million by eight hundred and sixty-nine.

2. £79, 15s. 11¼d. + £896, 14s. 10½d. + £968, 10s. 6¾d. + £785, 7s. 9½d. + £405, 18s. 7¾d. + £83, 19s. 5½d.

3. A man gave five pounds to his three sons. The eldest received £1, 18s. 9d., and the second 5s. 10d. less. How much did the third get?

CARD 31.

1. Take sixteen shillings and twopence three-farthings from one hundred pounds, five shillings, and a penny farthing.

2. How many times will 46 exactly divide three hundred and twenty-four thousand three hundred?

3. A man earned three guineas a week, and his expenses were: Housekeeping, £1, 5s. 11½d.; rent, 6s. 9d.; other expenses, 14s. 10d. How much had he left weekly?

CARD 32.

1. What is the sum of eight hundred and seven pounds, fourteen shillings, and threepence three-farthings; nine pounds, thirteen shillings, and sixpence farthing; four hundred and twenty-eight pounds, eleven shillings, and elevenpence halfpenny; seventy pounds, ten shillings, and tenpence farthing; and fifty-four pounds and ninepence?

2. How much greater is eighty thousand four hundred and nineteen pounds, twelve shillings, and tenpence farthing than seventy-nine thousand eight hundred and six pounds, seventeen shillings, and elevenpence halfpenny?

3. There were ninety-two thousand four hundred bricks in a yard. Of these one-quarter was removed, and the remainder was carted away in loads of three hundred and fifty. How many loads were there?

CARD 33.

1. £7906, 15s. 7d. – £6998, 17s. 8¾d.

2. What is the quotient of ninety-three thousand two hundred and thirty-four and two hundred and forty-six?

3. A farmer bought a horse for £17, 19s. 6d., and a pony for £9, 13s. 9d. He sold them both for thirty guineas. How much did he gain?

CARD 34.

1. Divide the difference between forty thousand and seventy-six and twenty-five thousand nine hundred and eight by 56.

2. Find the amount of £824, 16s. 8½d.; £673, 19s. 11¾d.; £409, 17s. 10½d.; £785, 12s. 10½d.; £540, 18s. 9d.; and £268, 15s. 7¾d.

3. Two boys visit an orchard, and bring an equal number of apples. One goes 72 times, and brings 28 each time. The other goes 63 times; how many apples does he bring each time?

CARD 35.

1. Find the difference between ten thousand pounds and three-farthings.

2. What is the five hundred and ninety-sixth part of 414220?

3. One boy has 7 half-crowns, and another boy has 25 sixpences and 59 pennies. How much more has one than the other?

CARD 36.

1. 508706 ÷ 97.

2. Add eighty-four pounds, thirteen shillings, and eightpence three-farthings; seven thousand and forty-pounds, eight shillings, and tenpence farthing; ninety-five pounds, seventeen shillings, and fourpence halfpenny; one thousand and thirteen pounds, ten shillings, and sevenpence; seven pounds, fifteen shillings, and tenpence farthing; and four hundred and six pounds, nine shillings, and sixpence three-farthings.

3. George has £3, 9s. 5d., and Richard has twice as much. How much have they together?

CARD 37.

1. What is the difference between three thousand and four pounds and half a crown and six hundred and eighty-seven pounds, eleven shillings, and eightpence halfpenny?
2. How often is three hundred and nineteen contained in three hundred and twelve thousand six hundred and twenty?
3. A horse was bought for £29, 17s. 9d. How much should it be sold for to gain £5, 18s. 6d.?

CARD 38.

1. £876, 13s. 9½d. + £7050, 18s. 6½d. + £69408, 14s. 10¾d. + £97, 10s. 8½d. + £28,549, 17s. 11½d. + £5, 15s. 3¾d. + £52, 19s. 7½d.
2. From four thousand one hundred and six pounds, fifteen shillings, and twopence three-farthings take nine hundred and eight pounds, sixteen shillings, and sevenpence farthing.
3. The quotient in a division sum is 396, the divisor is half the quotient, and the remainder is half the divisor. What is the dividend?

CARD 39.

1. What must you add to six thousand and eighty-seven pounds, eighteen shillings, and ninepence three-farthings to make forty thousand and sixteen pounds, eleven shillings, and sevenpence halfpenny?
2. Divide one hundred and twenty-three thousand nine hundred nuts equally among 19 dozen and 8 boys. How many will each boy receive?
3. A table cost £4, 15s., and a couch cost half as much. What change would be received out of a ten-pound note?

CARD 40.

1. Find the sum of £6719, 14s. 8½d.; £376, 19s. 10½d.; £28093, 12s. 11¾d.; £58, 16s. 5½d.; £8940, 7s. 9d.; £45625, 15s. 7¾d.; and £837, 13s. 3½d.
2. What number multiplied by 615 will give three million one hundred and sixteen thousand two hundred and five?
3. A horse was sold for forty guineas. What did it cost the dealer if he gained £9, 5s. 3d.?

## ANSWERS.

CARD 1.

1. 270 quotient and 20 remainder.
2. £15040, 0s. 11½d. 3. £14, 17s. 10d.

CARD 2.

1. £278, 17s. 9d. 2. £15038, 12s. 4¾d.
3. 65 marbles each, and 36 marbles more.

CARD 3.

1. 275 times. 2. £10291, 5s. 1¾d. 3. £2, 12s. 6d.

CARD 4.

1. £12384, 14s. 1¾d. 2. 89. 3. £4, 12s. 4d.

CARD 5.

1. £2798, 14s. 10¾d. 2. 5070. 3. £1, 19s. 8d.

CARD 6.

1. £13194, 9s. 8½d. 2. 750 times. 3. 351 eggs.

CARD 7.

1. £986, 19s. 0½d. 2. £63926, 16s. 0½d. 3. 58 nuts.

CARD 8.

1. 1423 quotient and 426 remainder. 2. £3914, 5s. 5¾d.
3. £13, 0s. 9d.

CARD 9.

1. £164241, 19s. 9d. 2. £584, 19s. 7½d. 3. 13½ hours.

CARD 10.

1. 782. 2. £118265, 14s. 2½d. 3. £974, 13s. 3d.

CARD 11.

1. 39 remainder. 2. £6017, 15s. 9½d. 3. £3.

CARD 12.

1. £94813, 19s. 11¾d. 2. 16s. 10½d. 3. 71808 words.

CARD 13.

1. 2290. 2. £59166, 9s. 10½d. 3. £98, 11s. 9d.

CARD 14.

1. £14373, 17s. 3½d. 2. £886, 17s. 8½d. 3. 66 buyers.

CARD 15.

1. £1984, 15s. 1¾d. 2. £470. 3. £2, 8s. 9d.

CARD 16.

1. £33213, 8s. 6½d. 2. £13383, 18s. 9¾d. 3. 3 oranges.

CARD 17.

1. 717 quotient and 251 remainder. 2. £799, 5s. 7¾d.
3. 15s. 10d.

CARD 18.

1. £18649, 5s. 8¾d. 2. £991, 15s. 9½d. 3. 36760.

CARD 19.

1. 228. 2. £17, 11s. 4½d. 3. £23, 10s. 6d.

CARD 20.

1. £1007, 18s. 8½d. 2. £92693, 10s. 4½d. 3. 17 hours.

CARD 21.

1. 490. 2. £7518, 14s. 10½d. 3. 3s.

CARD 22.

1. £43975, 13s. 5¾d. 2. £705, 9s. 10¾d. 3. 468.

CARD 23.

1. £515, 18s. 8¾d. 2. 560. 3. £1, 15s. 10d.

CARD 24.

1. £715137, 13s. 3½d. 2. £982, 16s. 1½d. 3. 777 sheep.

CARD 25.

1. 6095. 2. £4032, 5s. 11¾d. 3. £13, 19s. 9d.

CARD 26.

1. £1451, 6s. 5½d. 2. 7069 parcels. 3. 6s. 3d.

CARD 27.

1. 3608. 2. £6994, 4s. 7½d. 3. £2, 7s.

CARD 28.

1. 3378 quotient and 28 remainder. 2. £4585, 0s. 7¾d.
3. £1, 8s. 6d.

CARD 29.

1. £506, 15s. 7¾d. 2. 533553. 3. 29 wagonettes.

CARD 30.

1. 863 quotient and 53 remainder. 2. £3220, 7s. 3½d.
3. £1, 8s. 4d.

CARD 31.

1. £99, 8s. 10½d. 2. 7050 times. 3. 15s. 5½d.

CARD 32.

1. £1370, 11s. 4¾d. 2. £612, 14s. 10¾d. 3. 198 loads.

CARD 33.

1. £907, 17s. 10¾d. 2. 379. 3. £3, 16s. 9d.

CARD 34.

1. 253. 2. £3504, 1s. 9¾d. 3. 32 apples.

CARD 35.

1. £9999, 19s. 11¼d. 2. 695. 3. 1d.

CARD 36.

1. 5244 quotient and 38 remainder. 2. £8048, 15s. 11½d.
3. £10, 8s. 3d.

CARD 37.

1. £2316, 10s. 9½d. 2. 980 times. 3. £35, 16s. 3d.

CARD 38.

1. £106042, 10s. 9½d. 2. £3197, 18s. 7½d. 3. 78507.

CARD 39.

1. £33928, 12s. 9¾d. 2. 525 nuts. 3. £2, 17s. 6d.

CARD 40.

1. £90653, 0s. 8½d. 2. 5067. 3. £32, 14s. 9d.

*Cards 41–50, with Answers, will appear next month.*

# The Practical Infant-School Teacher.

## OUR MODEL INFANTS' SCHOOLS.

### II.—DENNIS ROAD BOARD SCHOOL, BIRMINGHAM.

*Head-Mistress*—MRS. F. E. MARLE.

YOU go from New Street Station (L. and N.-W. Railway) by tram to the district of Sparkbrook. It is a two-penny ride, and the route fringes a part of Old Birmingham. You pass the Convent in Bradford Street, and the "Ship" in Camp Hill, a hostel where, it is said, Prince Rupert spent a few anxious days during the Parliamentary wars. Then you begin to feel you are entering a neighbourhood of a very different character from that through which you have passed. The business air is there, as it has been all along, and the houses and shops are just as crowded; the population, too, is just as dense; but the road is wider, and you can breathe more easily. You can see that you are gradually passing beyond the region of smoke. You are, in fact, nearing the boundary of the ever-growing city. At Stoney Lane you leave the tram; you will have had quite enough of its jolting and its snorting steam-horse. Follow the road straight along, and in five minutes or thereabouts you will be in a new and well-to-do district, where, if there be a school at all, it will be a comparatively new one. Here is a road lately cut through a well-known nursery garden, with a house in it only here and there; a little to the right is a park, not a large one, certainly, but large enough to contain a bandstand, a children's playground, and an extensive covered shed. A little beyond is a patch of land ripe for the roadmaker's shovel, and providing the builder with ample scope for speculation. In the midst of it all, sure, ah, sure, there *is* a school. It stands snug and quiet, with plenty of open space around it. It has been built longer than the newness of the district would seem to warrant, for you learn that the Birmingham School Board is always on the lookout for probabilities in the nature of school accommodation. Six years is the age of the school. It is like a prim little child—bright and clean, and not looking its age. No smoke has yet begrimed its walls. Its playground—an extensive one—is spotless, and seems to convey the idea that it has been scrubbed. The caretaker's house stands just within the gate—an ideal little house, with an ampelopsis and an ivy gradually creeping up its walls, while in the windows, and underneath them, in a narrow border, flowers, bright in the September sun, add a charm to the sombre asphalt of its yard. As you enter the infants' playground you see a bright little fellow standing guard over a number of pots of palms and aspidistras, whose leaves have just been syringed and sponged. He directs you to the entrance door, and as at the same moment the children are coming out to play, you stand aside and let them pass. On inquiry for the mistress, you are politely ushered through a well-arranged corridor and cloakroom to a central hall. You find her busy for a moment giving instructions to one of the staff. Then a brief self-introduction, and you are at home. She is pleasant and cheerful, no awkwardness or reserve in her manner; you feel you have met a friend. You have not given her notice of your visit, but, having expressed your purpose in paying it, you are met with a courteous and willing readiness to grant you all you desire. For this you feel truly grateful, especially as, looking round, you know you are in the kind of school not to be found everywhere or every day. You are not surprised to find everything surpassingly clean, for you had evidence as to what it would be like the moment you approached its outer gate. You are standing in a spacious hall, the floor of which is laid with rather large oblong-shaped pine blocks. There are the usual classrooms round, in this instance six in number, each accommodating sixty children. No class is taught in the hall. What a blessing to have so spacious a place in which to practise drill, dances, games, and marching! If you will remember that you are in an infants' school, you will not need to be told why all the pictures and photographs on the walls, why all the specimens in the museum cupboard, why everything, in fact, is juvenile in character. Little children are the subjects of its pictures; little children's playthings and pets are the objects in the museum. There stands by the piano—a very handsome one—one thing, however, that *is* large. It is the rocking-horse, a strong, bay-coloured, noble, magnificent-looking creature, ready saddled and bridled for a morning "run."

#### Marching.

The children are marching in from the playground, marching in excellent stride and step to the tune of "See how merrily the time goes by;" and you notice—you cannot help doing so—that the step is not a jerky, choppy, baby step, but one that is calculated to help the teachers in the upper school to obtain easily, and without the lapse of weeks, a steady marching stride. You notice, too, that the piano is played now loud, now soft—soft when the class is near, loud when far away. This, you say to yourself, is hardly worth taking note of; but it is an indication of the way in which you find everything done—minutely, accurately, carefully in every detail.

You want to see the school at work. Mrs. Marle is ready to show you all you desire. First the babies. Isn't it strange that every mistress wants to show you the babies first? She wants, so it would seem, to make you young again—to make you live in the present as you have often wished you had had the opportunity of living when *you* were a baby at school. Then, alas, all was work, all was toil; there was but little play. "B-u-t, but; a-n-d, and," was most likely the way *you* were initiated into the mysteries of the spelling of your native tongue. But you find that is not the way nowadays. This is merely an example. The babies are not at spelling. You wonder what they *are* doing. They are standing in rows in their classroom, every face beaming—yes, beaming with delight. Several are holding flower-pots in their hands, one holds a watering-can, another has a hoop and stick, while there is one—a little girl—with a skipping-rope. The teacher takes no notice of you. It is the babies who have all her attention. They turn, the classroom door is opened, and to the strains of music again they march into the hall. You cannot guess what they are going into the hall for; you must be told straight off. They are going to play a garden game. And they are going to learn something even while they play. They will connect their object lessons and their conversational lessons with

their game. Notice how they do it. You will learn the game quite as readily as they, provided you are young enough. It is quite new to them. It is the first time they have played this particular game, so consider yourself fortunate in being on the spot while it is being taught.

### A Garden Game.

The teacher explains that the hall is to be made into a garden. The children, with pots of flowers, are to make the flower-beds. Those with garden tools are to pretend they are the gardeners. Those with hoops, balls, and skipping-ropes are to play in the garden. The gardeners must first *make* the garden. The others must watch and wait till the garden is ready. The little fellows with pots then arrange them, under the teacher's direction, in groups—half a dozen here, another half-dozen somewhere else, and so on. It is beginning to look like a garden—green, if nothing else, and, if the truth were to be known, more real to the players than to the lookers-on. The gardeners must now be busy. They must weed between the flowers, they must pick up the fallen and dead leaves (imaginary), they must sweep the paths (also imaginary), water the plants, and do exactly what they think a real big gardener would do. The others can play. Be careful to play in a gentle way; don't tread on the flower-beds; and children must never touch or pull flowers without first asking father. The flowers are to make the garden pretty. You may play just where you like. The little girl with the hoop plays now on the grass, now on the path; the boy with the whipping-top tries what he can do on the grass, and not knowing that he is courting failure, finds it out, and forthwith seeks a more hopeful place for his fun on one of the paths. The gardener with the broom comes along, and with a cheery "Mind that top, little one," brushes past, while the "little one" waits till he is gone. You have never seen such fun before. Romping, skipping, watering, weeding, rolling (with a model lawn-roller), all are doing something, all are acting their parts. It is real play on an imaginary stage. Wait a moment. There is a development here—a development that will show how intensely little ones of four years old can enter into imagery with that fullness that is the cause of psychologists advocating the culture of imagination so earnestly as they do. What is it? A little fellow has rambled off all alone. Yonder he is, right away from the flower-beds, looking eagerly up the wall of the room, using both his hands on the polished pine-wood wainscoting, for he cannot reach the bricks. What is he doing? Watch him, and if you cannot tell, you will not have entered into the game so cleverly as a four-year-old. He is actually bird-nesting in the hedge. He is pushing aside the twigs, standing on tiptoe, peering here and there, hoping to find a dear little egg in a dear little nest.

You will find that games are a special feature of this school (see time-table), and you will notice that the ordinary work is not in the least degree interfered with on that account. If anything, the games have brightened the work. No lessons could possibly be conducted more cheerfully, and no children could respond to the teaching more readily. Look at the happy faces of the little sailor boys who are dancing the hornpipe in the playground (Illustration No. 1), and ask yourself whether such merry, such interesting little fellows could fail to please you in whatever work you demanded of them.

A HORNPIPE IN THE PLAYGROUND.

You leave the children at their play, and make the tour of the classrooms. The baby room is empty, but that does not prevent you from seeing specimens of their efforts in the art of caligraphy. The writing is clear and bold—just the kind to form the little hand and make it supple enough to do greater things by-and-by. In looking at this beautifully regular work your eye has involuntarily gone time after time to the blackboard. This runs along one side of the room, and seems to be used for one purpose only—sketching. Upon it, in lovely colours, are drawn object-lesson illustrations. No words can give an idea of their beauty. The drawing, the colouring, and the full effect are altogether beyond description. It would appear as though the teacher were an Apelles or a Landseer, so true, so perfect, and so enthralling are the illustrations. You think the school is fortunate in having *one* such artist on its staff. But your idea is an imperfect one. The whole of the staff are adepts at this kind of work, and every blackboard in every room is made beautiful with pastel and chalk. The illustrations are not drawn to decorate the room; they are there to give vividness and life to the object teaching and conversational lessons. You make inquiries, and ask how it is that the teachers can produce such aids of their own; and you wonder what is to become of the publishers who spend so much on machinery, etc., in providing the wall pictures that are nowadays to be bought so reasonably and printed so well. You are told that it is not because the teacher is an artist born, but an artist made. When she joined the staff she knew not how great a gift she had, but her power was found by trial, by encouragement, and by perseverance. Her first attempts were feeble enough, and she hardly likes to remember them; but, thanks to the inspiration that one good soul gets from another in this, and indeed in every effort, her work is now an easy task. This eulogy does not refer to any individual, but to every member of the staff. The illustrations on page 251 show what can be done in the direction of blackboard drawings.

### Object Teaching.

The scheme of object lessons is as simple as it is complete. The course throughout the school comprises the following subjects, each being taken by one class, beginning with the lowest—Farm Life, Bird Life, Ocean Life, Insect Life, Plant Life, and Flowers of Field and Hedgerow. It is not at all necessary to give a detailed list of the lessons. They suggest in themselves what they are likely to be. This, however, must be said: they go very deeply into the matter, and in every way the classroom shows how devoted the teacher is to the particular work in hand. Take, for example, the room in which you are supposed to be—the baby room, where Farm Life is the course. The pictures on the wall show a farmer at work, ploughing, sowing, reaping; animals of every sort, and under different aspects, are to be seen—the horse patiently drawing his heavy load, the cow giving up her milk to the dairymaid, a donkey ridden by children; while that lovely set of "Ten Animal Pictures for the Infant School," published by Thomas Nelson and Sons, hang conspicuously in a group. Some of the pictures have been brought by the children themselves. They have procured them from many sources—from almanacs, from magazines, and from their photographing friends. In addition to those on the walls, there are some in a huge portfolio.

# DENNIS ROAD SCHOOL, BIRMINGHAM—INFANTS' DEPARTMENT TIME-TABLE.

| Day. | Class. | 9.30 to 10. | 10 to 10.30. | 10.30 to 10.45. | 10.45 to 11. | 11 to 11.30. | 11.30 to 12. | 2 to 2.15. | 2.15 to 2.20. | 2.20 to 2.50. | 2.50 to 3.15. | 3.15 to 3.30. | 3.30 to 4. | 4 to 4.20. | 4.20 to 4.30. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONDAY. | I. | Word Building. | Reading. | RECREATION. | Mental Arith. | Transcription. | Written Arith. | Mental Arith. | REGISTRATION. | | | RECREATION. | Physical Exercises. | Stories. | DRESS AND DISMISSAL. |
| | II. | ,, | ,, | | ,, | ,, | ,, | ,, | | Boys: Drawing. | | | Recapn. Obj. Less. | ,, | |
| | III. | ,, | ,, | | ,, | ,, | ,, | ,, | | Girls: Needlework. | | | ,, | Kin. Games. | |
| | IV. | Word Build. & Read. | Object Lesson. | | ,, | ,, | ,, | ,, | | | | | Word-build. Games. | ,, | |
| | V. | Word Reading. | ,, | | ,, | Physical Exercises. | ,, | ,, | | | | | Recitation. | Obj. Less. Drawing. | |
| | VI. | Letters. | Writing. | | Object Lesson. | Mental Arithmetic. | Phys. Exercises. | Recitation. | | Needle Drill. | Kindergarten. | | Physical Exercises. | Guessing Games. | |
| TUESDAY. | I. | Word Building. | Reading. | | Mental Arith. | Dictation. | Written Arith. | Mental Arith. | | | | | Hand and Eye Training. | | |
| | II. | ,, | ,, | | ,, | Transcription. | ,, | ,, | | | | | Physical Exercises. | Guessing Games. | |
| | III. | ,, | ,, | | ,, | ,, | Kin. Games. | ,, | | Boys: Drawing. | | | Recapn. Obj. Less. | Stories. | |
| | IV. | Word Build. & Read. | Kindergarten. | | Kindergarten. | ,, | Written Arith. | ,, | | Girls: Needlework. | | | Recitation. | Kin. Games. | |
| | V. | Word Building. | ,, | | ,, | ,, | ,, | ,, | | | | | Conversation. | ,, | |
| | VI. | Letters. | Writing. | | Dictation. | Kindergarten Games. | Object Lesson. | Recitation. | | Kindergarten. | Singing. | | Physical Exercises. | Conversation. | |
| WEDNESDAY. | I. | Reading. | Object Lesson. | | Mental Arith. | Transcription. | Written Arith. | Mental Arith. | | Singing. | Kindergarten Games. | | Recitation. | Maypole Dance. | |
| | II. | ,, | ,, | | ,, | ,, | ,, | ,, | | Kindergarten Games. | Singing. | | ,, | Word-build. Games. | |
| | III. | ,, | ,, | | ,, | Dictation. | ,, | ,, | | Singing. | Recitation. | | Physical Exercises. | Guessing Games. | |
| | IV. | Word Build. & Read. | ,, | | ,, | Transcription. | ,, | ,, | | ,, | Number from Objects. | | Obj. Less. Drawing. | ,, | |
| | V. | Word Building. | ,, | | ,, | ,, | ,, | ,, | | Kindergarten Games. | Recapn. Obj. Lesson. | | Guessing Games. | Singing. | |
| | VI. | Letters. | Writing. | | Singing. | Mental, with Objects. | Drawing. | Recitation. | | Needle Drill. | ,, | | Drawing. | Conversation. | |
| THURSDAY. | I. | Word Building. | Reading. | | Mental Arith. | Copy Books. | Written Arith. | Mental Arith. | | | | | Brushwork. | Guessing Games. | |
| | II. | ,, | ,, | | ,, | Transcription. | ,, | ,, | | | | | ,, | Brushwork. | |
| | III | ,, | ,, | | ,, | ,, | ,, | ,, | | Boys: Drawing. | | | Tablet or Ring Laying. | | |
| | IV. | Word Build. & Read. | Object Lesson. | | ,, | ,, | ,, | ,, | | Girls: Needlework. | | | Physical Exercises. | Conversation. | |
| | V. | Word Building. | ,, | | ,, | ,, | ,, | ,, | | | | | Recitation. | Singing. | |
| | VI. | Letters. | Writing. | | Recitation. | Singing. | Object Lesson. | Recitation. | | Number from Objects. | Conversation. | | Kindergarten. | | |
| FRIDAY. | I. | Reading. | Object Lesson. | | Mental Arith. | Transcription. | Written Arith. | Mental Arith. | | Physical Exercises. | Singing. | | Recapn. Obj. Less. | Moral Lesson. | |
| | II. | ,, | Kindergarten. | | Kindergarten. | Mental Arithmetic. | Object Lesson. | ,, | | Kindergarten Games. | ,, | | Recitation. | ,, | |
| | III. | ,, | Object Lesson. | | Mental Arith. | Brushwork. | Brushwork. | ,, | | Recitation. | ,, | | Word-build. Games. | ,, | |
| | IV. | Word Build. & Read. | Writing. | | ,, | Kindergarten. | Kindergarten. | ,, | | ,, | ,, | | Recapn. Obj. Less. | ,, | |
| | V. | Word Building. | Kindergarten. | | Kindergarten. | Object Lesson. | Writing. | ,, | | ,, | ,, | | Physical Exercises. | ,, | |
| | VI. | Letters. | Writing. | | Singing. | Dancing. | Object Lesson. | Recitation. | | Kindergarten. | Kindergarten Games. | | Drawing. | ,, | |

NOTES:—1. A criticism lesson, at which all the teachers are present, is conducted on the first Tuesday of every month at 11.30 a.m.
2. Registers are marked † 9.25 a.m. and 2.15 p.m., and are finally closed at 9.30 a.m. and 2.30 p.m.
3. Form and colour are treated as kindergarten.

This way of storing pictures deserves a line or two to itself. By means of two large sheets of cardboard, the teacher has made a case which is fixed low down on the wall within the children's reach. The edges are bound with bright-coloured tape, the ends are made of canvas, which enable the boards to be opened and shut; and on the front is a picture indicating its use. Hardly a week goes by but some addition is made to its contents. The parents seem to be particularly keen in providing their little ones with illustrations for object and conversational lessons. You notice how inseparably the home and school are linked together. The room in which Ocean Life is the subject for the year contains some strikingly good illustrations. On the blackboard is a splendid drawing of a fashionable seaside resort. It shows children at play on the sands and among the rocks, while boats are rocking on the waves, etc. The wall pictures are: the Fisherman, the Coastguardsman, the Lifeboat Man, a Lighthouse, a Lifeboat, Sailing Ships and Steamers, Corals and Sea Anemones. The museum contains specimens of shells and seaweed, which have been brought by the children, and point to many happy hours on the sands. It seems hardly fair to leave out from the description an enumeration of all the illustrations that are used in these lessons, but enough has been said to show how unsparing the teachers and children have been in their endeavours to make the courses complete.

### Conversational Lessons

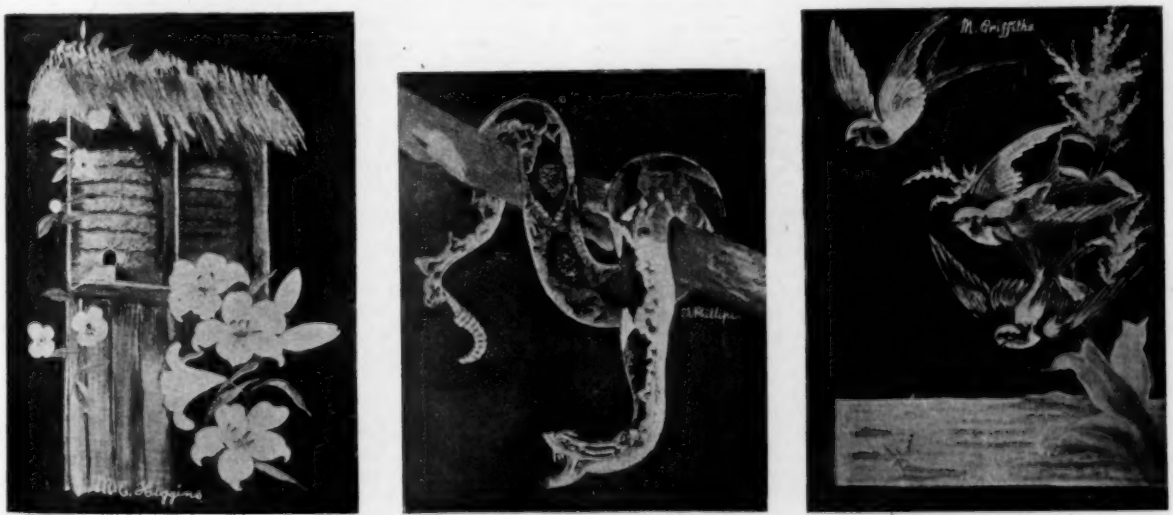
are another feature of the school. These do not necessarily follow on the same lines as the object lessons, but they are included. They are among the most interesting and helpful lessons, and they form the basis of as many other branches of work as possible, composition especially. Correlated, for example, with

### Clay Modelling,

they help in a wonderful way to assist the child in getting a true and natural representation of the object he is making. You are fortunate in being able to see one such lesson. There has previously been a talk on a nail. Its form, its manufacture, and its uses have all been discussed, and now a nail is being modelled in clay. There is the point to pierce, the stem to hold, and the head to hammer. All the specimens are wonderfully true, and as accurate as little fingers can mould them. You notice, in looking at this work, what a saving there is in apparatus. Not that the class is stinted in any way, for the Birmingham School Board is generous in the supply of materials for whatever work is sanctioned in the schools; but, having regard for cupboard space, the same trays are used for modelling that are used for thread-laying. These are square trays of japanned ware, and they serve the purpose of modelling-trays when turned upside down. They have this advantage over wooden boards: they are more easily cleaned. Each child cleans his own with a little damp sponge served out for the purpose.

### Drawing and Brushwork.

The visit is being paid at the end of the second month of the school year, so that you must not expect to find the work at a very advanced stage. The drawings of the previous year have all been returned to the children who executed them, or have been given, with the children's consent, to visitors who may have asked for them. You can see, however, that the work is being done on true lines. Nature drawing enters largely into the course, and pretty little specimens of the work of the first eight lessons, or thereabouts, are shown to you. Not too much time is taken up in mere form work, such as the common, the *very* common "blob," but a rose leaf and bud (never mind the exaggerated serrations of the leaf), a pea-pod, a clover leaf, and a daisy are some of the exercises already done or contemplated. The children mix their own paints, and learn to put away their little paint-boxes in a clean and tidy manner. Attention is paid to "growth" in drawing, and such little points as these are at an early age instilled into the minds of the children by means of the conversational lessons mentioned a little earlier. Mrs. Marle contemplates introducing a little free-arm drawing, and possibly a little ambidextrous drawing, into the curriculum; and when the time arrives for her to do so, the long sweeps of lines that are now apparent in the freehand drawings will help her to get some good work of the larger sort. It is quite a mistake to imagine that little hands can only make little curves. In the drawings shown to you there are curves which, in point of length, and boldness too, will compare favourably with many made by children of older years.



TEACHERS' BLACKBOARD DRAWINGS.

Till now, the visit has been taken up with looking into the lighter kind of work. This has been entirely circumstantial. There is, however, one more class that time will allow you to see, and luckily the lesson is

### Arithmetic.

A week's teaching is being tested. These are the tests:—*Teacher*—"I put nine papers on the desk, and then eleven more papers. I want you to tell me how many papers I put on the desk in all. Call the sum number one. Here is number two: There are twelve boys in the playground. If five of them go through the gate into the street, how many will be left in the playground?" The exercises are repeated by a pupil teacher, who is assisting with the class,

NOTES:—1. A criticism lesson, at which all the teachers are present, is conducted on the first Tuesday of every month at 11.30 a.m.
2. Registers are marked at 9.25 a.m. and 2.15 p.m., and are finally closed at 9.30 a.m. and 2.30 p.m.
3. Form and colour are treated as kindergarten.

and, after the repetition, the children set to work to solve the difficulties presented. A little device has been practised by them, when setting down the sums, to keep them from confusing the operations. To sum number one the sign of addition was made, and to number two the sign of subtraction. They were not told to do this; it was done by habit. You are anxious to know how the accuracy of the work came out; but so sure were you, from the intelligent way in which the sums were listened to, as well as from the clear way in which they were set down, that you can well afford to believe that most, if not all, will be correct.

The morning has gone pleasantly, and all too soon. There has been nothing to see but what has given infinite delight. There is, however, just one more treat—namely, a chat with the mistress and the staff. The children now are gone, and you feel ripe for a friendly discussion on the general conduct of the school. The staff is a united one. They are more familiar with one another's methods than is usual in a school where classroom teaching only prevails. As a rule, if you box a teacher up in a classroom, it is seldom that her methods and ways are known outside. Here each teacher thoroughly understands the others. This is the result of staff conferences. During the chat the word "mother" comes up, and this is the keynote to the whole. The school is a family, and Mrs. Marle is the "mother" of the school-home. As in families each child is known by his or her Christian name, so it is here in this school. Charlie Jones and Charlie Evans are both "Charlie," although they may sit side by side. This method is not so inconvenient as at first it would appear to be. The home is in another way bound up with the school life. Parents often visit the school on special occasions, and even on ordinary days they are always most welcome. Mrs. Marle believes that the more intimate the parents are with the school and its institutions, the more sympathy and help is forthcoming from them in times of need. Our cover illustration shows the school hall decorated and ready for a First of May demonstration. A May Queen is chosen and crowned. Festivities of the usual kind are indulged in, and summer is ushered in with the shouts and hurrahs of the Dennis Road happy little folks.

You look through a series of Government reports, and from the beginning to the end there is actually no disparaging remark. Every phrase used is a congratulatory one. The visitors' book contains the names of many noted educationists of the country, and several from foreign parts, while not the least pleasing feature is that among the signatures are many names of Birmingham masters and mistresses. The school has gained a reputation worthy of an older school, and Mrs. Marle is personally held in very high esteem by her colleagues in the city. For some time she was the treasurer of the Birmingham Board Head-Teachers' Association, and often she has served on a deputation to the Board when something has been wanted, or some evil has needed redress. She is always earnestly listened to, for her experience and ripe judgment are very valuable.

Notwithstanding the great demands that are made on the infants' departments in Birmingham by every section of the Inspectorate, both Government and Board, Mrs. Marle is happy and contented in her work. When,

> "With gentle yet prevailing force,
> Intent upon her destined course,
> Graceful and useful all she does,
> Blessing and blessed where'er she goes,"

then there is no fear but that her work will long be remembered and cherished in the minds of the little ones who form part of her intensely interesting and happy family.

**TEN ANIMAL PICTURES for the INFANT SCHOOL.**

***These Illustrations are Beautifully Printed in Colours.***

They are mounted on Stiff Cards ready for hanging up. Size, 14 inches by 18 inches.

**Price 5s. per Set of Ten.**

Subjects:—Cow, Calf, Cart-Horse, Donkey, Duck, Goat, Hen and Chickens, Peacock, Pig, Sheep.

THOMAS NELSON AND SONS, London, Edinburgh, and New York.

# A METHOD OF TEACHING NUMBER TO INFANTS.

## II.

## NUMBER: TRANSITION FROM UNITS TO TENS, AND ADDITION OF TWO LARGE UNITS.

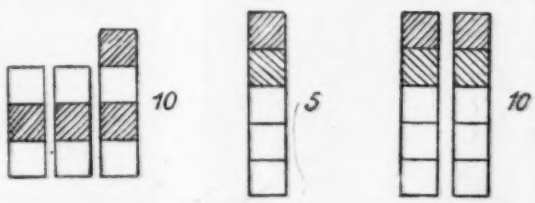
BY C. M. A. COOMBS, L.L.A.

**Introduction.**—It is assumed that the analysis, synthesis, and pictures of the numbers 2 to 10 (inclusive) have been thoroughly mastered. The next step is to pass from the consideration of a single number to a double number, as it were; that is to say, we shall now think of our unit bound up with something else. Together they make a new kind of whole.

Proceed as follows:—

**Apparatus.**—The teacher only is provided with apparatus. The children have reached an age when it is not necessary for them to *handle* in order to comprehend. They are now able to concentrate their thought on what they can *see* only. The teacher should have 100 small cubes, coloured if possible.

**Method.**—*Step I.: Transition.*—Build up picture of ten. This represents ten ones to the child. To emphasise the fact that we are now going to deal with a *new* kind of number, the child must recognise not only ten ones, but one ten. Use these actual cubes, and instead of making three red ones *lie down*, make them *stand up*. Now place two blue ones on top of red ones. Children will recognise this as being 5, and having learned the synthesis of ten, they can tell what is to be done to make this 5 into 10. Place second five by the side of first five: we get thus two fives, and a compact picture of 10. This picture is easier to deal with in

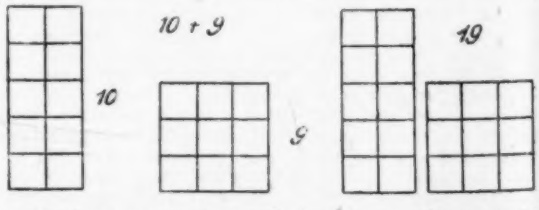



future manipulation than the unit picture of ten, and it also emphasises the change, we might almost say *state*, of the number.

Teacher should now show two tens 20; three tens 30; four tens 40; and so on up to 100. If possible, place these ten tens on a shelf in front of class, and allow them always to be there. This will accustom the children to the nature of ten. Allow any backward child to take teacher's place and manipulate the cubes for himself. He will soon grasp the point then.

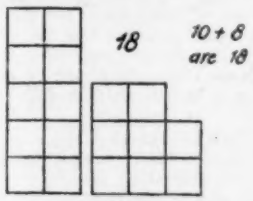
*Step II.: To add 10 and any Unit.*—Show 10 cubes. It is not necessary now to have three red and two blue cubes for five. The children know five standing up, therefore the 10 can be all one colour.

Place 9 cubes (in threes as in units) by the 10. We want to add 10 and 9. It is best to choose two numbers whose sums will be 14 or over; then the unit has its own name, and the ten is called "*teen*." This is a help to the child. After



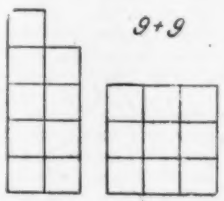

14, 16, 17, 18, 19 are mastered, the other numbers—15, 13, 12, 11—will present less difficulty than if we deal first with 11 or 12. We have 10 standing up, and 9 by the side. This

we will call nine-teen. Lay stress on both syllables. Children repeat aloud, "Ten and nine are nineteen." Place 10 cubes, and 8 by the side. This is 8 and "teen." Children can say 10 and 8 are 18. Deal in order with 17, 16, 14, 15,




13, 12, 11. Before this step is left, children should be able to answer without a moment's thought.

*Step III.: To add 9 and any Unit.*—Until now one 10 has remained untouched. Now the 10 has to be built up. Briefly recapitulate with cubes the analysis and synthesis of 10. Show 9 cubes; place by the side a second 9. The question is to add 9 + 9. 9 apples in one basket and 9 in another, how many?




*Principle.*—To make one of the two numbers into 10, the larger preferred.

**Method.**—Take one cube off second 9 and place it on first 9. This makes ten and 8 units. Children know this to be 18. It makes an easy distinction for children if the ten stands up, and nine is placed, as learned, in threes. The class should repeat all together, "Take one off 9, and put it on 9 to make it into 10: 10 and 8 are 18." We have used the same cubes, only placed them differently; so we can say 10 and 8 are 18, or 9 and 9 are 18.

Go through similar process with 9 and 8. 9 is to be made into 10; how many must we take off 8? Teacher should do process as children tell her how to. Allow a child here and there to come out and repeat process at dictation of class.

**9 + 8 are 17.**
9 + 7
9 + 6
9 + 5
9 + 4
9 + 3
9 + 2
9 + 1

All the numbers as far down as 9 + 1 should be demonstrated. After this children should be able to tell immediately 9 and any unit; they understand the reasoning, but it must become mechanical, the teacher often exacting the reasoning from a child here and there throughout the class. Directly 9 is said by the teacher, the children should know they must take one from second number.

This has already been done. Teacher should point out how numbers can be turned round, and that it is easier to take the larger to start with. Proceed with 8 and any unit exactly after the same manner as with 9; allow class to repeat the reasoning aloud. Keep up practice with 9. Associate 8 with 2. The quick children will add as quickly as teacher; and if a card (see diagram) is kept in a prominent place, with one picture of all the numbers, the teacher will find, by referring to this card, that even the slow children will soon master this process.

8 + 9
8 + 8
8 + 7
8 + 6
8 + 5
8 + 4
8 + 3
8 + 2
8 + 1

7 + 9; 7 + 8—both these have been done.

7 + 7; 7 + 6; 7 + 5; 7 + 4—to be demonstrated with cubes.

7 + 3; 7 + 2; 7 + 1—were all learned as parts of ten, etc., units.

6 + 9; 6 + 8; 6 + 7—all been done.

6 + 6; 6 + 5—to be demonstrated.

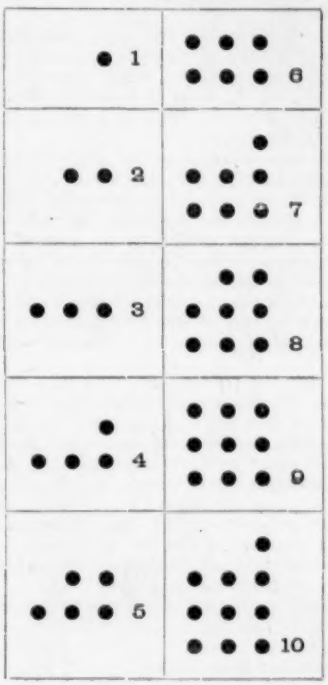
6 + 4; 6 + 3; 6 + 2; 6 + 1—all known.

5 + 9; 5 + 8; 5 + 7; 5 + 6—all been demonstrated.

5 + 5; 5 + 4; 5 + 3; 5 + 2; 5 + 1—all known.

It is therefore seen that it is unnecessary to deal with any numbers below 6 in this way. This process of addition always proves a thoroughly enjoyable part of their number, therefore perfection should be exacted of the children. After this stage is mastered the children should be vigorous little thinkers, and eager to know more of the mysteries of arithmetic.

DIAGRAM.




# PAPER-CUTTING AS A MEANS OF EXPRESSION.

"Development consists in taking in, assimilating, and *giving out*."—BOWEN.

"If your child learns from anything he makes
To study somewhat things that lie around,
Follow creative voice whene'er it wakes:
The building of a rich new world he's found."
FROEBEL.

## I. The Occupation of Cutting.

CUTTING is a favourite occupation of the nursery, partly because imitation guides the child to do what he sees the grown-ups about him do, and partly because of the variety of form, colour, and subject afforded. Give a child scissors and paper, and he is happy. Froebel, in his search for employments congenial to little children, saw the possibilities of a pair of scissors, not merely as a tool of destruction, but as a useful implement for the first stage in a process of construction.

To this end, he devised a series of symmetrical courses in which the cutting of paper, folded to eight thicknesses, produces pieces of a definite number, shape, and proportion, the arrangement of which into a harmonious design exercises the inventive faculty.

The variety of the work, involving, as it does, folding,

cutting, arranging, and pasting, and the beauty of the production, which is altogether the child's own, make the occupation fascinating.

It is not so much with the forms of beauty—to give the Froebelian phraseology—nor with the forms of knowledge possible with cutting, though these latter are very important (several of Euclid's propositions can be materially demonstrated—notably I. 47 and II. 4 and 7, etc.), but with the forms of life, that it is here intended to deal.

### II. Importance of Expression.

The laws of mind and of body are analogous, and we can learn of the unseen by observing the visible, and noting causes and effects.

What is it that shows full vigour and complete vitality?—Action. We judge of a man's physical condition by what he does. Mental power is shown, in the same way, by what the mind gives out, not by what it takes in; for only what is given out can be gauged. What is taken in is more or less of an unknown quantity.

What is it that conduces to full vigour, especially in the young growing body?—Action, exercise, movement, even though there be no conscious purpose and little utilitarian result. The growth accomplished through the doing is Nature's aim, and she attains it in spite of parents and teachers, who do their best to thwart her; but they never succeed long in keeping a healthy child still.

Apply this to the region of mental operations. Mind shows its growth by what it gives out, rather than by what it takes in, though the latter process is a necessary preliminary to the former.

In this giving-out process the mind uses the body as its agent, and so we see one of the fundamental connections between mental and physical development. To train the eye to see, and the hand to execute the mind's dictates, is an important part of a true education.

At first **imitation** enters largely into the doing. A child always does what he sees others do. Then he goes further, and begins to originate in the same direction on his own account; and thus are shown the first signs of that individuality, the divine spark, the personality which is to distinguish that creature from all others.

**The Material precedes the Verbal Expression.**—Unfortunately, it is possible to stifle this tendency of self-expression to a large extent, but the importance of fostering it is being more and more realised.

An intelligent child is judged mainly by his power to use words, by his ability to converse about things around him. But every teacher knows the difficulty of getting children to talk freely, especially those who are neglected, or who come from poor homes. The reason lies partly in the fact that words are not a natural means of expression for a child. His vocabulary is too limited for general use, and he does not know the meaning of half the words he hears. Give him a slate and pencil and he will quickly show his meaning.

In a school where children were encouraged to practise free drawing, a little boy five years old one day offered to show his teacher where he had been the previous Saturday. The test of success then, as always, was the ability of the onlookers to guess what the drawing represented. He produced a rough, crude outline of the Tower Bridge, showing the two massive piers, and the connection between, just in the act of lifting. There was no mistaking it.

Now, had that child been restricted to verbal description, it might have been long before we would have found out what he wanted to tell us. Children are more or less in the position of the Englishman who, on arrival at a French hotel, without a knowledge of the language, was obliged to indicate that he wished to have a fowl for dinner by flapping his arms for wings, and crowing in imitation of a cock.

Material expression is the sphere for little children, and they will utilise it to its full possibilities if they are given the opportunity; but meanwhile they are gaining in the power and knowledge of words.

Things before words is the order in the giving out as well as in the taking in.

**Suitable Occupations.**—The kindergarten gifts and occupations were devised to encourage and incite children to this free expression of ideas, and to provide suitable materials. Some occupations are more convenient than others, because some materials are more free from limitations. Again, there are occupations suitable for inventions and designs—an important branch of expression work—for example, tablets and mats; but they are of little value for the life forms. The occupations best suited for the last named are modelling, drawing, brush-work, and cutting. The last is not known so well as it deserves, owing to a lack of practical information, and an exaggeration of the difficulties which appear on the surface.

**Difficulties: How to meet them.**—1. *Scissors.*—Never use sharp-pointed scissors. Broad, flat-pointed scissors, which can only be misused by design, not by accident, can be obtained cheap at kindergarten depots.

2. *Paste.*—Mix starch with a little cold water, and pour on sufficient boiling water to "turn" it. It should be thick, but capable of being poured. Pour into saucers or open ink-wells, and supply one for every two children. This paste is clean, and is quickly made.

3. *Distribution of Materials.*—Until the children become skilful, it will be found most convenient to take the cutting for one lesson, the adding of inner lines and colour and the pasting for the other. Hence all the implements will be seldom required at one time.

Make bags of brown paper—get the older children to help—and, previous to the lesson, put in the necessary materials. The bags can then be passed in the ordinary way.

Penny gum brushes (9d. a dozen) are quite suitable. Plain white note-paper, or foolscap, or coloured paper (1d. a sheet, 24 in. × 18) can be used, and the mount may be brown paper or coloured card. For any special work, an effective mount is obtained by using gray card, which makes a capital background for either white or coloured forms.

4. *The Work itself.*—Give preliminary practice in the use of the scissors. Bear in mind that what the child gains by the production is of more importance than any outward result.

It is necessary for the teacher to have the class well under control. Deprivation of the material should be the penalty of misuse, and it is a sufficient check for most children. The power gained by the teacher over the children, in consequence of the attractive nature of the work, is not the least of its advantages.

**The American Educational Exhibit**, brought to Manchester from Paris by a ship specially chartered, showed that cutting is largely recognised by the American kindergartners as an occupation specially suited for expression work, and that it is capable of being developed to correspond with the demands of older children.

## METHOD OF WORKING.

### I. Preliminary Practice.

At least half a dozen lessons will be necessary.

*First Lesson.*—Introduce by a short talk about the material (paper) and the tool (scissors)—their use and abuse, their substance, and give simple account of their manufacture. Provide blunt-pointed scissors and sheets of newspaper.

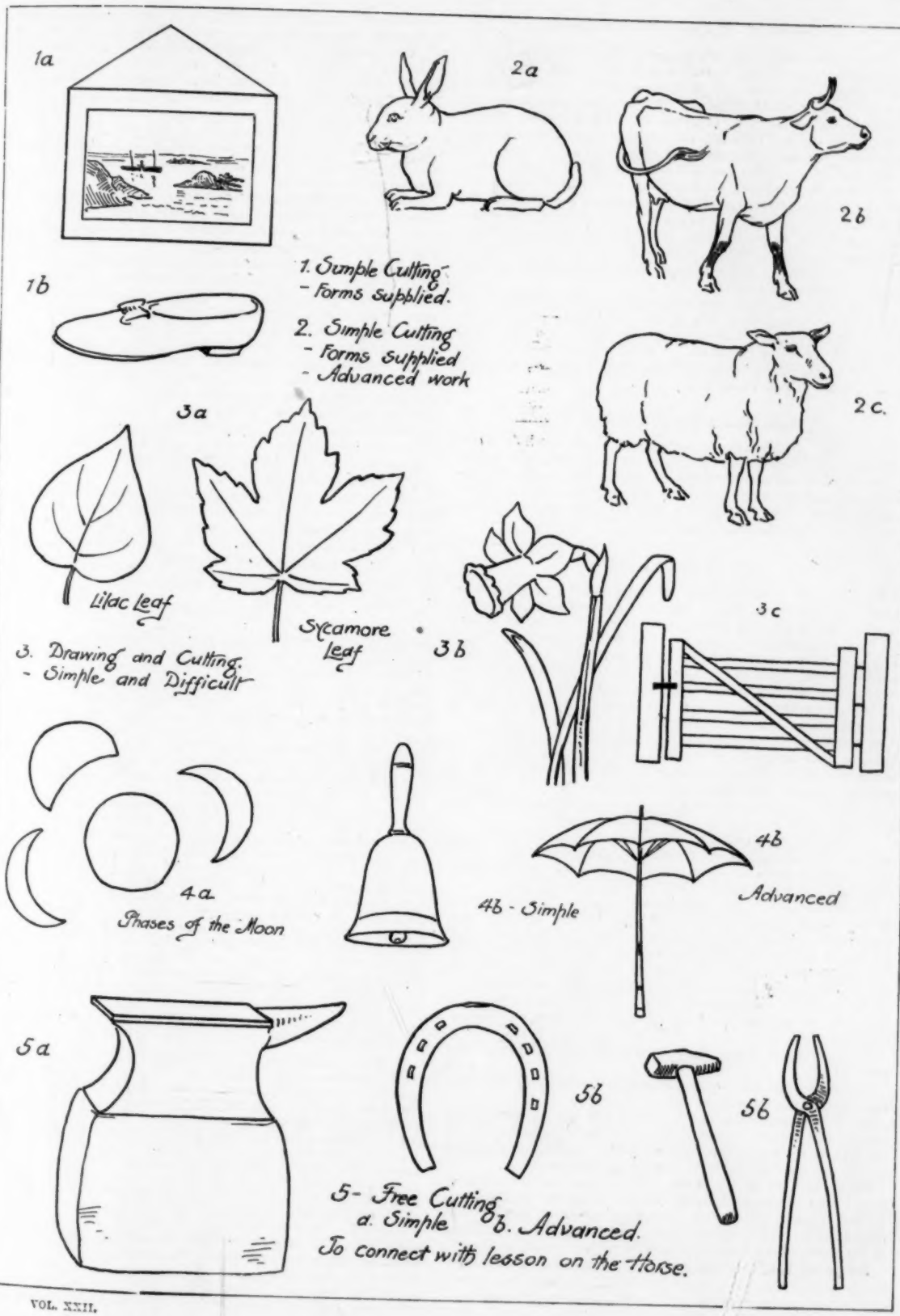
*First Step.* How to hold the scissors. (Show the comfortable position between finger and thumb.) How to open and shut the scissors. Boys are specially awkward at first.

*Second Step.* To cut along short, straight, and curved lines, in different directions. Here the knowledge of form gained in previous work will be found a help. In first stage let children draw on blackboard what they think they are to cut, and so ensure a definite notion and purpose.

*Third Step.* To cut along long lines, straight and curved. For long cuts, open the scissors wide, and cut with one movement; for curves, move the paper round to the scissors, rather than the scissors to the paper.

NOTE.—Direction is better obtained when the eye follows the point of the scissors than when the hand is closely watched.

*Fourth Step.* To cut out simple pictures from magazines, old reading books, etc.


1a
2a
2b
1b
1. Simple Cutting
- Forms supplied.
2. Simple Cutting
- Forms supplied
- Advanced work
2c.
3a
Lilac Leaf
Sycamore Leaf
3b
3c
3. Drawing and Cutting.
- Simple and Difficult
4a
Phases of the Moon
4b - Simple
4b
Advanced
5a
5b
5b
5- Free Cutting
a. Simple b. Advanced.
To connect with lesson on the Horse.

### II. Imitation Stage.—(Forms supplied.)

This is the method generally used: Each child has a hectographed copy of the object, which is first cut and then pasted on the mount. It is very good for the first few lessons; but just as crutches prevent free movement of the body, so copies prevent free expression of the mind. Use copies till the children are accustomed to the tools and materials, but move to the next stage as soon as possible. This method is useful for difficult forms, such as animals; and it may be advisable to return to it occasionally, if only for the sake of variety. Always require a faithful following of the outline, when it is given. For children six years old a term's work—one lesson a week—would be sufficient for Stages I. and II.; for children of five years a little longer would be required; but in this, as in other things, be guided by the children themselves.

The first forms given must be simple in outline, and not too small for easy manipulation. Such things as a picture, the school clock, a jug and basin, a school chair, a boot or shoe, a hat, are useful to begin with. Other objects will occur to the teacher as the outcome of the work in nature, number, etc. (Illustrations 1 and 2.)

### III. Drawing and Cutting.

Encourage children to draw copies, so that the whole of the work will be their own. The sketches they will get from the blackboard illustrations of the nature lessons, such subjects as leaves, flowers, tools, etc.—anything which is not too difficult to draw. The field gate is easy to draw, but hard to cut and paste. (Illustration 3, *a*, *b*, and *c*.)

### IV. Free Cutting.

This is the most valuable of the methods, and not the most difficult, when once a fair start is made, and accuracy is not looked for. It leads to the technical work of dress-cutting and pattern-making. It follows logically from Stage III., though its beginnings are concerned with much simpler forms, as the child is guided by his eye and imagination only. It is well to have a preliminary drawing at first, not on the material to be cut, but on slate or blackboard, just to crystallise the idea in the child's mind.

(*a*) *Preliminary Practice.*—The necessary skill will have been gained partly in previous stages. A little practice to show the effect of the different movements of the scissors will be useful. Give a drawing on the blackboard, and tell the children to cut it out in newspaper. A variety of forms, symmetrical and irregular objects, can be used.

(*b*) *Cutting on Double Paper.*—Any symmetrical form—such as a lamp, umbrella, flower-pot, vase, watch, or school bell—can be more easily made if the paper is doubled and only half the form is cut. (Illustration 4, *a* and *b*.)

(*c*) *Freehand Cutting.*—Begin with simple forms, such as fruits—apple, pear, melon, vegetable marrow, tomato, also carrot, etc.; simple animal outlines—fish, bird, cat, dog; and gradually increase in difficulty as the children grow in skill. Accept at first slight approximation to correct form, so that the children may not be discouraged. The real success lies in the mental power gained by the children in making the attempt, not in the excellence of the production. (Illustration 5, *a* and *b*.)

Two excellent plans were shown in the American exhibit:—

(*a*) A drawing and cutting and a free cutting of the same object were placed side by side.

(*b*) Two impressions were made of the same object by the one cutting—first, by using the form cut; second, by using the paper from which it was taken, so that the blank space on the background gave the second impression.

**Suitable Age of Children.**—Each stage in its simplest forms may be taken with the fives. Here the outlines will be bold, with little detail. The more advanced work is sufficient, as the illustrations show, to tax the skill of children of six years, and it can be developed for use with Standard I.

**Scope of Work.**—The taking in of ideas is a necessary preliminary to giving them out; so, before requiring children to express themselves by means of drawing, free cutting, etc., be sure they have had opportunity of acquiring the material for expression. To this end, all the object cutting should be connected with the nature lessons, where the children will have seen and handled different objects, and had pictures and illustrations brought under their notice. Where possible, allow children a choice of objects, so that all the class will not be doing the same thing; and, when finished, they will amongst them have illustrated the connected nature lesson from every side.

**Colour and Markings.**—Colour is a desirable adjunct, as it makes the forms more natural and pleasing. The lines within the outline are required to show the other essential elements of the representation.

Colour is combined with cutting in two ways:—

(*a*) *By painting or colouring* with crayon after the form is cut. This requires skill and care, and should come as a reward to those who have done their best at the cutting.

(*b*) *By using coloured paper.* Where more than one colour is required, as in the case of flowers, etc., a new difficulty arises, because part of the form has to be cut on one paper and part on another. Here, again, the addition of colour as a reward will give an impetus to best effort, especially when the children realise the pretty effect of the coloured as compared with plain paper. Where only one shade is necessary, coloured paper should be used in preference to the white, so long as the correct colour can be obtained.

The work as described above is practised in several elementary schools, and with capital results, and there is nothing in it which the average teacher and average infant class (five years and six years) cannot attempt. At first move slowly; but when once the children become familiar with the materials, their power will increase rapidly.

## REVIEWS.

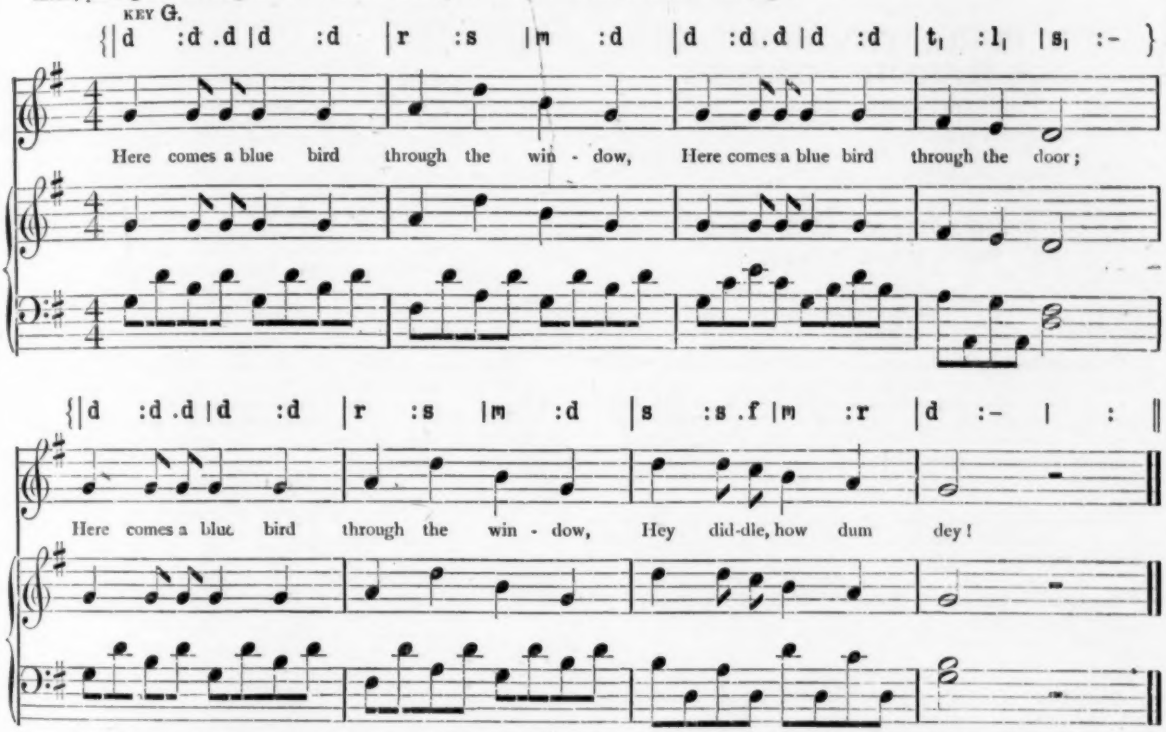
**Belgium and the Belgians**, by Cyril Scudamore, is an illustrated and tastefully-bound volume in a series now being issued by Messrs. Blackwood and Sons of London and Edinburgh. A year or so ago we favourably noticed the first volume sent us, entitled *Holland and the Hollanders*, and to-day we have Mr. Scudamore's beautifully-produced book before us. Belgium, as many know, is an interesting and charming country. It requires but a modestly-filled purse to get there; but when there, the ordinary guide-book is a poor *compagnon de voyage* if one's mind is not fairly well stored with knowledge relating to the history, the art, and the government of the country. This book deals in a pleasant way with all that concerns the country and its people, and, so to speak, fits the reader to appreciate and enjoy that which is merely indicated by the guide-book. The author has wandered over the whole of Belgium, and there is much evidence of painstaking work in the interesting chapters here presented. How Belgium is governed; Brussels, Bruges, Ghent, and Waterloo; Antwerp and the ports; the holiday ground of the country—all come in for full and careful treatment. The sketch of primary, secondary, and professional education in the country is particularly full, and well worth the notice of those of our readers who are interested in the notes which appeared last month on the Belgian Teachers' Congress at Mons. Chapters on the military system, religious bodies, colonisation, and folk-lore are also of much value. Altogether we have found it a most instructive and readable book, and one which should find a permanent place on the bookshelf of every teacher.

**A New Commercial Arithmetic.** By George E. Dench, B.A. (Thomas Nelson and Sons.) It needs little looking to see that the author of this latest treatise on commercial arithmetic has done his work well, for the most cursory glance shows a gratifying wealth of diagrammatic illustration that makes the reader feel that he is in the presence of an enthusiastic and thorough demonstrator who is not to be satisfied with half-knowledge; and such indeed is the case shown to be upon closer inspection of the mode of treatment of the subject. In particular do the sections on short methods, decimals, carpets and paper-hanging, and duodecimals strike us as fresh and stimulating. We have no hesitation in describing the book as far ahead of most books on commercial arithmetic, and we recommend its merits to all teachers of the subject.

# MUSICAL GAMES FOR INFANTS.

## BLUE BIRDS AND YELLOW.

A ring of girls, with hands clasped and lifted. A girl—named according to the colour of her dress, blue bird, yellow bird, etc.—enters, passing into the ring under the arch formed by the lifted hands of the others. All sing—

KEY G.

{| d :d .d | d :d | r :s | m :d | d :d .d | d :d | t, :l, | s, :- }
Here comes a blue bird through the win - dow, Here comes a blue bird through the door;
{| d :d .d | d :d | r :s | m :d | s :s .f | m :r | d :- | :
Here comes a blue bird through the win - dow, Hey did-dle, how dum dey!

She seizes one of the players and dances off with her, moving round the outside of the circle, and in an opposite direction, all singing—

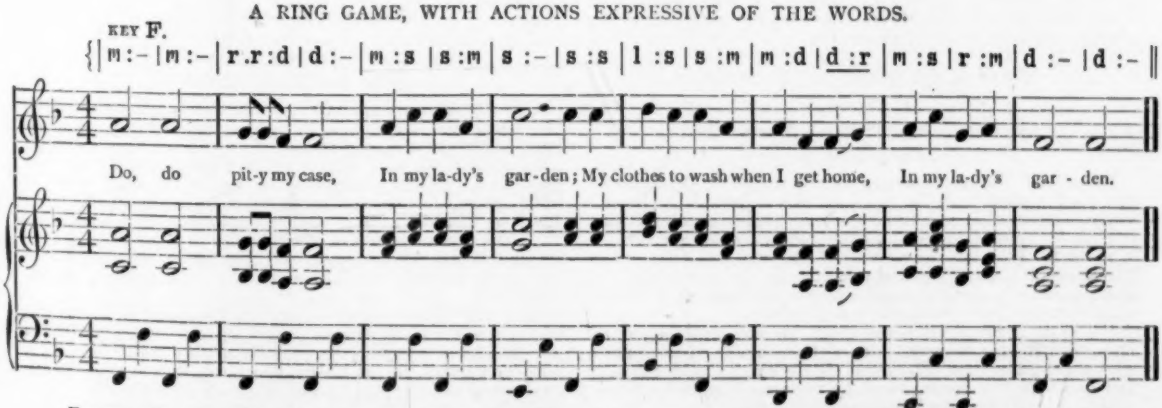
Take a little dance, and a hop in the corner,
Take a little dance, and a hop on the floor;
Take a little dance, and a hop in the corner,
Hey diddle, how dum dey!

The game then begins again, the previously chosen player leading till all have been engaged.

## PITY MY CASE.

A RING GAME, WITH ACTIONS EXPRESSIVE OF THE WORDS.

KEY F.




For succeeding verses the ring closes, and the game goes on as before, new words, such as "My clothes to iron when I get home," "My boots to brush," "My hair to comb," "My face to wash," etc., being used with each new turn. One girl may occupy the centre of the ring and give the actions if preferred, or different girls may do this in turn. Change direction of *turning* in these games at each new verse.

# OUR TUTORIAL SECTION

## OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

*Principal of the Belvedere Pupil Teachers' Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.*

### SPRING EXAMINATION, 1902.
### Eighth Month—November.

WORK TO BE PREPARED.

1. ENGLISH.

*Candidates.*—Gray's *Elegy*, verses 29–32. Analyse the whole, and parse all words presenting difficulty.
*First Year.*—The *Expostulation*, lines 197–240, or *The Task*, Book V., lines 220–249. The derivations of all important words should be learned, especial notice being taken of the prefixes.
*Second Year.*—*Paradise Lost*, Book III., lines 463–522.

2. COMPOSITION.

Write one or two essays each week from the list given in the *Pupil Teacher's English Notebook*, and send one up occasionally for revision.

3. HISTORY.

*Candidates.*—Charles II., James II., William and Mary.
*First Year.*—Henry VII.
*Second Year.*—George II.

4. GEOGRAPHY.

*Candidates.*—Ireland: physical features, climate, productions, and industries.
*First Year.*—Siberia, Turkestan, etc. (Russia in Asia).
*Second Year.*—South America.

5. ARITHMETIC.

*Candidates.*—Simple proportion.
*First Year.*—General exercises on the year's work.
*Second Year.*—Problems on motion.

6. EUCLID AND ALGEBRA.

*First Year.*—Euclid: Props. 25 and 26, with four deductions per week. Algebra: general examples on the year's work.
*Second Year.*—Euclid: Props. 11–20, with four deductions per week. Algebra: problems on equations.

### Notes on the Work for the Month.

1. ENGLISH.

*Candidates.*—GRAY'S "ELEGY," verses 29–32.

*General Paraphrase (continued).*

Verse 29. "The next morning we saw him borne slowly to his last resting-place with the sad and solemn sounds of funeral music. He was buried beneath yon old thorn-tree, and you may still see his epitaph engraved on the stone above his grave."

Verse 30. Here lies the remains of one who was unknown to Fame and Fortune. Notwithstanding his lowly position, he was an assiduous and successful follower of knowledge, but his mind was ever tinged with gloom and sadness.

Verse 31. His generosity was great, his soul was simple and open, and Heaven rewarded him with happiness commensurate with his consideration for others. His sympathy with the poor and destitute was recompensed by the true friendships he enjoyed—the only blessing he ever greatly desired.

Verse 32. Seek no further to find out his better qualities, or to discover his weaknesses and sins. They rest in the grave with him, and they are known to God alone, who will regard and judge both in fatherly love.

*Notes on Parsing and Analysis, etc.*

Verse 29. *Next.* Adjective (superlative degree of *near*), qualifying *morn* understood.
*Dirges.* The solemn music or singing used at funerals. The word "dirge" is a contraction of the first word of the Latin service: "Dirige, Domine, nos," etc.
*Slow*—that is, *slowly.*
*Borne.* Forms part of the object of *saw*, qualifying *him.*
*For thou canst read.* The meaning of the words is that any one who took the trouble to look out Gray's tomb would surely be able to read.
*Canst* is not an auxiliary but a principal defective verb. Parse:—
*Canst.* Verb, irregular, defective, indicative mood, present tense, singular number, second person, agreeing with its nominative *thou.*
*Read.* Verb, irregular, transitive, infinitive mood, forming the completion of the defective verb *canst.*
*Yon.* Adjective demonstrative, limiting *thorn.*
Verse 30. *The lap of Earth.* The Earth is the mother of all, and dying is but laying the tired head down as in a mother's lap.
*To Fortune and to Fame unknown.* Hardly correct in Gray's case. He probably felt that his work would for ever preserve his name.
*Own.* Adjective of emphasis, limiting some noun as *possession* understood.
*Science.* In the fuller meaning of the Latin, *scientia* = knowledge generally. The word is now usually restricted in meaning.
Verse 31. *As.* Adverb of degree, modifying *largely.*
*Largely.* Adverb of degree, modifying *did send.*
Supply *which* after *all.*
*Tear.* In apposition with *all.*
Read: *It was all that he wished.*
Verse 32. Analyse: *You* = subject; *seek* = predicate; *no further* = extension of degree; *to disclose his merits or to draw his frailties from their dread abode* = object.
*No.* Negative adverb, modifying *further.*
*Further.* Adverb of degree, modifying *seek.*
*Alike.* Adverb, modifying *repose.*
*Bosom.* In apposition with *abode.* The whole of this line is an enlargement of the object of the first sentence in the stanza.

*First Year.*—COWPER'S "TASK," BOOK V.

*General Paraphrase (continued).*

Line 220. The art of making weapons was not destroyed by the flood. As the number of men increased, they gradually spread over the land, and became divided into tribes and clans. They claimed the land, hill, or valley on which they settled as their own, and the pleasurable feelings which arose from the act of personal possession prompted them to acquire still more. Some by diligence so improved and cultivated their fields that the latter became an object of attraction to those who held less favourable and valuable spots, and thus bloodshed soon arose—one party fighting to retain what they held, others to deprive them of it.

Line 229. These contests were at first nothing but a wild struggle, without any definite plan of fighting; but very soon the advisability of adopting some regular method led them to select a leader who had proved his courage, strength, and ability. The supremacy he exercised in war was soon extended to times of peace, for they quickly found the necessity of a ruler to control them when not fighting. And thus war led to the selection of one pre-eminent above the others, who eventually, from the

demands of government, became king. "King" was too great a title for any man to wear without becoming arrogant, and proud, and intoxicated with the loftiness of his position. There is a very regrettable quality which may often be observed in the lower ranks of life. Feeling themselves to be inferior in every way to those above them, and destitute of the necessary energy and ability to raise themselves, they not only relinquish any idea of improving their position, but allow themselves to sink much lower than they need.

*Notes on Parsing, Analysis, etc.*

Line 220. *Ere long.* May be considered as an adverb, but it would be well to point out that it is an ellipsis for *ere a long time had elapsed.*

222. *To call.....own.* The object of *had begun.*

223. *Own.* Adjective of emphasis, or emphatic pronoun.

225. *More.* Adjective quantitative, comparative degree, limiting *property* understood.
*Industry.* Subject of *made.*

226. *To improve* and *to cultivate.* Infinitives, limiting *industry*, of which they are enlargements.

227. *Covet.....fair* = object of *made.*
*Covet.* Verb in the infinitive mood, having for object the noun sentence *what.....fair.*
*Fair.* Adjective, qualifying *what.*

230. Supply *was.*

233. *Leader.* Residual object. (See note on line 217.)

234. Read: *And they reverenced him no less in peace for sake of warlike deeds.*
*Less.* Adverb of degree, limiting *reverenced.*

236. *To control.* Infinitive, limiting *worthy* (a common use of the infinitive).

237. Read: *As he was worthy.*

239. *One chief. One* = direct object, and *chief* = factitive object, of *made.*

240. *Too.* Adverb, modifying *have.*

241. *King* and *whom* (239) are both objects of *made, king* being the factitive object.

242. *To wear.* Infinitive, limiting *proud.*

244. *Who.* Antecedent is *their* (= of them).

245. *To intoxicate.* Infinitive, limiting *sure.*
Supply *which* before *it.*

246. *It.* Impersonal pronoun, in apposition with the noun sentence *That.....lower.*

247. *Parcel.* Nominative case after *being.* So also *destitute* (248).

248. *To raise.* Infinitive, limiting *means.*

249. *Than.* Comparative conjunction, joining *they settle lower* and *they need settle.*

Full notes on the *Expostulation* will be found in the edition published by Messrs. T. Nelson and Sons.

*Second Year.*

All necessary notes on parsing, analysis, paraphrase, explanations, etc., will be found in the text-book recommended—Milton's *Paradise Lost*, Book III. (Messrs. T. Nelson and Sons).

2. HISTORY.

*Candidates.*—The chief points in the reign of Charles the Second are:—

(*a*) The Clarendon Code of Laws (Corporation Act, Act of Uniformity, Conventicle Act, and Five-Mile Act), directed against the Nonconformists.
(*b*) The Dutch War, when England lost for a time the supremacy at sea which was gained by Blake.
(*c*) The Great Plague and the Great Fire.
(*d*) The Test Act and the Habeas Corpus Act. The latter is very important, as it prevented imprisonment for a long period on no definite charge—a means often used by the Stuarts to punish those who opposed them.
(*e*) The sham plot of Titus Oates.

*In James II.*:—

(*a*) The attempts made to restore the Roman Catholic religion.
1. Putting on one side the Test Act.
2. Attempt to govern by means of the judges, High Commission, and the army.
3. Declaration of Indulgence.
4. Forced admission of Catholics to the universities.
(*b*) The rebellion of Argyle in Scotland, and of Monmouth in England.
(*c*) The Bloody Assize of Judge Jeffreys.
(*d*) The trial and acquittal of the Seven Bishops.

*In William and Mary*:—

(*a*) The Declaration (afterwards Bill) of Rights.
(*b*) The reduction of Scotland and Ireland.
(*c*) The Mutiny Act, Toleration Act, Triennial Bill.
(*d*) William's attempts to curb the power of Louis the Fourteenth; the war, and the treaty of Ryswick.

It should also be carefully noted that the Revolution not only put an end to the misrule which had been common under the earlier Stuarts, but commenced a new era of rule by the people. Every clause in the Bill of Rights is important. The commencement of a National Debt, the Bank of England, government by party, a legal standing army, are points which should be noted.

*First Year.*—The reign of Henry the Seventh commences a new era. Previous to this all Europe had been more or less continuously engaged in warfare. The Dark Ages, as they are called, had not allowed any great development of commerce, but now a period commenced when brains were more important than physical strength. There were many causes at work to produce this. The conquest of Constantinople by the Turks in 1453 scattered the learned men of the Eastern Empire all over Europe, and commenced the great Renaissance or Revival of Learning, which was still further promoted by the disputes which soon arose over the reformation of the church. The introduction of printing led to a comparatively cheap and easy dissemination of literature. The discovery of the New World by Columbus was soon followed by the exploration of the great part of the hitherto unknown world. New markets were opened. Men turned their attention more to the arts of commerce than to the exercise of arms. The old feudal nobility was gone, and with them the feudal system. For these reasons the reign of Henry the Seventh is regarded as the commencement of modern history.

The points which require especial attention are:—

1. The reasons why the Tudors exercised such nearly absolute rule:—
(*a*) The Wars of the Roses had impoverished, and, in fact, nearly destroyed the old nobility that had acted as a check on the king.
(*b*) The church was lacking in enthusiasm and vigour.
(*c*) The Parliament was subservient to the king.
(*d*) The growth of prosperity amongst the middle classes led to a desire for a strong and peaceful rule.
(*e*) The Crown was the only remaining power in the country.
(*f*) The Tudors were by character fitted for absolute rule.

2. Henry's means of raising money:—
(*a*) By the Star Chamber.
(*b*) By fines and confiscations of Yorkist estates.
(*c*) By benevolences (Morton's "fork").
(*d*) By fines for breaking obsolete statutes (Empson and Dudley).
(*e*) By grants from Parliament for war, and grants (£149,000) from the French king for not going to war.
(*f*) The dowry of Catherine of Aragon.

3. The risings of Lambert Simnel and Perkin Warbeck.

4. The marriage of Catherine of Aragon with Prince Arthur, subsequently with Prince Henry, led indirectly to the Reformation; that of Margaret with James the Fourth of Scotland resulted in the Stuarts ascending the English throne.

The Star Chamber existed in the reign of Edward the Third, and was revived by Henry as a Committee of the Council to aid him in his absolute government. It punished by fines, whipping, branding, etc.—in fact, any penalty but death. It dealt with cases of treason or sedition, libel, offences against royal prerogative. It tried offenders that could not be attacked by the ordinary courts, fined juries for bringing in erroneous verdicts, and was a court to which the king could at any time transfer a case from the other courts.

*Second Year.—George II.—Chief Points:*—

(*a*) Walpole's administration: peace at any price; position kept by bribery—"Every man has his price," etc.
(*b*) The War of the Austrian Succession. Macaulay's Essay on *Frederick the Great* might with advantage be read. Note that England was drawn into the struggle through the king's anxiety for Hanover. Battle of Dettingen.
Peace of Aix-la-Chapelle. The only clause which was of service to England was that by which the French agreed to abandon the cause of the Stuarts.
(*c*) Reform of the calendar, 1752. The necessity of this arose from the fact that England had continued to use the Julian calendar—that is, reckoning a year as 365¼ days, or eleven minutes too much. Calculating

the year too long to this extent made a difference of three days in 400 years, and hence England at this time was eleven days behind the time as shown by the sun, etc. To rectify this, the necessary number of days was dropped, and the recurrence of the mistake prevented by dropping three leap years in every 400—namely, those centuries of which the first two figures are indivisible by 4. Thus 1900 was not a leap year.

(*d*) The Seven Years' War. The causes of England's participation in this contest lay in three continents:—

1. In Europe. Maria Theresa had managed to form a tremendous coalition against Frederick, and as this included France, the fear of losing Hanover led the king to join Frederick and subsidise him to the extent of £700,000 a year.
2. In America. The standing quarrel between French and English colonists was accentuated by the attempt of the French to connect their provinces of Canada and Louisiana by a chain of forts up the Richelieu, down the Ohio valley, and thence along the Mississippi—thus cutting off the English colonies from the rich fur trade of the North-West.
3. In India. The rival schemes of Dupleix and Clive had resulted in the French and English being at war in India, although the countries were at peace.

The issues of the war were therefore—(1) Which country should be masters of the New World; and (2) which country should be predominant in India.

Note the reverses in 1757 and 1758, and the tide of success in 1759—"the most glorious year that England had ever seen, when you have to ask every morning," says Horace Walpole, "what is the latest victory, for fear of missing one." The capture of Ticonderoga, Niagara, and Quebec secured America to us. The defeat of the French at Havre, Lagos, and Quiberon Bay crippled their power; and their decisive defeat at Wandewash, in India, by the English under Sir Eyre Coote, gave British predominance in India.

### 3. Geography.

*Candidates.*—Draw a map, insert all physical features to be remembered, and practise till thoroughly known. Note the Giants' Causeway, the Lakes of Killarney, Valentia Island and the Transatlantic Cable. In learning the productions, note also that, as a result of glacier action at some remote period, all the coal deposits have been scraped off; and thus, with the absence of coal, there is a corresponding deficiency in the output of manufactures. The climate is very moist, hence the "Emerald Isle" and absence of wheat, etc.

*First Year.*—Draw careful maps. Note particularly the course of the Trans-Siberian Railway, commenced in 1891, to connect Vladivostock with Ekaterinberg, a distance of 4,000 miles. Irkutsk, west of Lake Baikal (3,830 miles), was reached in March 1899. The section from Vladivostock to Khabarovka is complete. A huge steam ferry runs across Lake Baikal. A branch of the line will also run south to Port Arthur.

The Trans-Caspian Railway runs to Baku, thence across the Caspian to Krasnovodsk, and on to Merv, Bokhara, Tashkend, with branches, one of which reaches within eighty miles of Herat.

*Second Year.*—Tabulate the countries as shown with regard to Central America. Prepare memory maps of the whole continent, and of the Amazon and Orinoco. Note the peculiarity of the fauna and flora; the meaning of such terms as llanos, selvas, pampas, cordillera, El Gran Chaco.

### 4. Arithmetic.

*Candidates.*—Great care must be taken to understand the theory of ratio and proportion.

*Ratio* is the relation existing between two quantities with respect to their magnitude.

*Proportion* is the expressed equality of two ratios.

*Direct Ratio.*—When each term increases or decreases at the same rate—for example, If 2 books cost 4s., 4 books cost 8s., etc.

*Inverse Ratio.*—When, as one term increases, the other diminishes—for example, If a quantity of food would last 4 men 8 days, it would last 8 men 4 days, 16 men 2 days, etc.

*Compound Ratio.*—To obtain the compound ratio of two or more ratios—for example, 2 : 3, 4 : 5—multiply the antecedents for a new antecedent, and the consequents for a new consequent. $2 \times 4 = 8$; $3 \times 5 = 15$. Hence the compound ratio is 8 : 15.

When four terms are in proportion, the product of the extremes = the product of the means; hence, if any one term be missing, no matter which it is, it may be found from the other three.

Ratio can only exist between quantities of the same kind. Why is the following incorrect:—As 2 books : 5s. : : 4 books : 10s.? There can be no ratio between books and shillings. It should be—As 2 books : 4 books : : 5s. : 10s.

In working sums in proportion, they should always be stated by *method of unity;* because children, as a rule, cannot understand the principles of proportion.

*Second Year.*—Problems on motion are often given. They are well explained in the text-book. A diagram is generally of use in enabling the student to solve. In the case of trains meeting or passing, remember—

$$\frac{\text{sum of lengths}}{\text{sum of speeds}} = \text{time of passing when meeting;}$$

$$\frac{\text{sum of lengths}}{\text{difference of speeds}} = \text{time of passing when one overtakes the other.}$$

If any difficulty is experienced with these sums, write for assistance.

*Test Questions.*

*Candidates.*

1. Analyse the following, and parse the words in italics:—

"*There*, at the foot of *yonder* nodding beech,
*That* wreathes *its* old fantastic roots *so high*,
His listless length at noontide *would* he *stretch*,
And pore upon the brook that bubbles by."

2. Write down all the terminations you can which form nouns from nouns or other parts of speech, and give the meaning in each case.
3. What do you know of the Plantation of Ulster?
4. Say what you can of the ideas held by the Stuart kings.
5. Give a complete account of the Hebrides.
6. What do you know of the following places:—Wick, Oban, Stornoway, Paisley, Iona, Peterhead, Dundee, St. Andrews? In what way is it proposed to facilitate communication between Scotland and Ireland?
7. Find the value of ·375 of a guinea + $\cdot\dot{5}\dot{4}$ of 8s. 3d. + $\cdot 0\dot{2}\dot{7}$ of £2, 15s. − ·775 of 5s. Ans. 10s.
8. Find the difference between $1\cdot 8\dot{0}\dot{7}$ and $2\cdot\dot{0}1\dot{2}$; and the value of $\cdot 9\dot{2}9\dot{7}$ of 1 lb. 7 oz. 2 drs.
Ans. $\cdot\dot{2}049413\dot{5}$; 1 lb. 5 oz. 8 drs.

*First Year.*

1. Analyse lines 204–210 *The Task*, and parse *awhile* (202), *longer* (204), *than* (205), *needs but* (207), *unquenched* (209).

*Or*, Analyse lines 189–196 the *Expostulation*, and parse *themselves* (189), *at last* (191), *lords* (192), *possessing what* (193), *like theirs* (195).

2. Give any examples of Greek prefixes you can, state the meaning of each, and give examples of words containing them.
3. State clearly the causes of the Wars of the Roses.
4. Give an account of the reign of Richard the Third, and say something of the character of that monarch.
5. Draw a sketch-map of the south coast of Asia, marking in the chief physical features. What similarity can you trace between it and the south coast of Europe?
6. Say what you can of the wild animals of Asia and their distribution.
7. A and B undertake to do each ½ of a piece of work. A begins at 9, B at 10.30; both stop at 12, having done ⅓ of the work. They resume at 1. A finishes his share at 4. When will B finish? Ans. 8.30 p.m.
8. In running a mile race A can give B 20 yards, and B can give C 88 yards. How many yards can A give C?
Ans. 107 yards.
9. A greengrocer buys a lot of apples at 3 a penny, and twice as many at 4 a penny. He sells them at an average price of 6 for 2½d. Find the gain or loss per cent.
Ans. Gain, 50 per cent.
10. Divide £386, 2s. 11d. among 5 boys, 2 women, and 2 men, so that each man has 4 times as much as a woman, and each woman 5 times as much as a boy.
Ans. Man's share = £140, 8s. 4d.; woman's = £35, 2s. 1d.; boy's = £7, 0s. 5d.

*Second Year.*

1. Paraphrase and analyse lines 451–462, and parse *fruits, nought seeking but, unkindly mixed, not, more likely, betwixt.*

2. Explain the following:—*jubilee, immortal amarant, sea of jasper, preamble sweet, the aspiring Dominations, Sericana.*
3. Give an account of the rebellion of 1715.
4. What do you know of the South Sea Bubble?
5. Write a short essay on the productions of Central America.
6. Make a list of the islands belonging to England in the West Indies. Which are the chief ports? How are they governed?
7. The whole outside surface of a cubic box is 2075·76 square feet. Find the length of one edge. Ans. 18·6 feet.
8. The length of a square room is 18 ft. 9 in.; the paper for the walls cost £2, 3s. 9d., at 4½d. per sq. yd. Find the height. Ans. 13½ feet.
9. The interest on £7560 amounts in 5 years to £1260 at simple interest. Find the rate. Ans. 3⅓ per cent.
10. I had £5000 stock in 3½ per cents. at 77. I sold out, and bought into the 4½ per cents. at 91⅔. Find how much stock I have now, and the change in my income.
Ans. £4200. £14 increase.

---

## SCHOLARSHIP EXAMINATION, 1901.

### Eleventh Month.

WORK TO BE PREPARED.

1. *Reading, Repetition, and Penmanship.*—Ten minutes' daily practice in each.
2. *Teaching.*—Chaps. xiii. and xiv., *Scholarship School Management.*
3. *Geography.*—
   (1.) Revise the British Isles.
   (2.) Revise South America.
4. *English.*—
   (1.) Twenty-five roots and meanings per week.
   (2.) General revision of any weak points.
   (3.) *Julius Cæsar.* Finish the play.
5. *History.*—The reign of Victoria.
6. *Arithmetic.*—Revise as much as possible of the theory.
7. *Algebra.*—Revise proofs of all rules.
8. *Euclid.*—Revise Props. 8–14, Book II., with ten deductions per week.
9. *Elementary Science.*—Finish the subject.
10. *Languages.*—Revise the text and notes in the Latin, read as much as possible in French, and look over the chief grammatical rules.
11. *Drawing.*—A freehand copy each week.
12. *Music.*—Finish the *School Music Teacher.*
13. *Domestic Economy.*—Revise Food: its functions and preparation. Clothing and washing.

### Notes on the Work for the Month.

1. *Geography.*—In reading up South America, pay particular attention to the productions, the chief ports and towns, states and their forms of government. South America is not often a topic for questions in examinations.

2. *English.*—Some definite plan should be adopted in revising the grammar. The following points may assist:—(1) Prepare exact definitions of all terms used; (2) prepare exact classifications of the various parts of speech; (3) learn thoroughly all rules of syntax—for example, the agreement of subject and predicate; (4) the irregularities in the inflections are often asked for; (5) note words that may be several parts of speech.

In the *Julius Cæsar*, as well as finishing the play, prepare lives and characters of the chief *dramatis personæ*, the date of the play, the sources from which Shakespeare drew his information, list of words used with a different meaning from the present.

3. *History.*—The reign of the late Queen is most important from the great advance made in every direction—in wealth (revenue increased from 40 to 120 millions), in territory, in education, in sanitation, in science (electricity and its many applications, the various scientific instruments, telephone, cable, phonograph, etc.), in surgery (use of anæsthetics), in temperance and morality, and in every direction we can possibly turn.

The chief events, etc., of the reign—such as the Repeal of the Corn Laws; the Chartists; the Crimean War; the Indian Mutiny; the numerous smaller wars, which are merely the surf of the advancing tide of civilisation; the various legislative measures (Reform Bill, Factory Acts, Education Acts, etc.)—must, of course, be thoroughly understood.

4. The points to which attention should be specially directed in the other subjects will be given next month. At the request of several readers, a complete Test Examination is appended. The sets of papers will be worked and criticised if desired for a fee of 5*s*. The questions will undoubtedly serve to indicate weak points.

### Test Examination.

1. PENMANSHIP.

(30 marks.)

Write, as specimens of copy-setting:—
(*a*) Large Hand—*Indefatigably.*
(*b*) Small Hand—*Friends, Romans, countrymen, lend me your ears.*

2. DICTATION.

(50 marks.)

Write the following passage from dictation. The piece should be read through distinctly once, then dictated in phrases as marked. Full stops should be given:—

In our own country | we have a happy example | of a system | which combines the best features | of monarchy and republic | — the splendour of the one | and the freedom of the other. | Our own constitution | has been called "a veiled republic," | and the epithet | seems to describe it truly. | We have all the advantages | that may accrue | from the presence among us | of a titular, hereditary sovereign, | and we have the great privilege | of being able, | through our elected representatives, | to control our national affairs. | Our constitution has | all the elements of permanency: | perfect freedom exists | among all classes within our shores; | we have passed through | all the intermediate stages | between barbarism and civilisation; | liberty and enfranchisement | have gradually extended, | until all now have their share | in the privileges | of Englishmen and citizens; | and Britain may well be described, | as the laureate | has so forcibly described it, | as a land |

"Where freedom slowly broadens down |
From precedent to precedent." |

3. THEORY OF TEACHING.

(100 marks. 2 hours. Answer *seven* questions, including the first, for which higher marks are awarded.)

1. Write notes of a lesson on *one* of the following subjects, and say for what standard or infant class you intend the lesson:—
   (*a*) A River.
   (*b*) Eclipses of the Moon.
   (*c*) A Flower.
   (*d*) The Use of Insects.
   (*e*) A Black-lead Pencil.
2. Give a sketch of a lesson to Standard V. on the Passive Voice.
3. Point out some of the uses of mental arithmetic. What steps would you take to ensure rapidity and accuracy?
4. A class becomes listless and inattentive. From what causes might this arise? How would you endeavour to restore animation and attention?
5. What are the uses of physical exercises? Describe some simple form of exercises which would be suitable for Standard I.
6. To what other points beyond the teaching of the Code subjects is it necessary for any teacher to give considerable attention?
7. Take the root *duco, ductum* = I lead, and show how you would use it as the basis for a word-building exercise.
8. What help have you been accustomed to receive (*a*) in the preparation of notes of a lesson? (*b*) after the lesson has been given?
9. Point out any advantages which may arise from the teaching of geography in combination with history.
10. You wish to teach *one* of the following facts:—
    (1.) The numerator and denominator of a fraction may be multiplied by the same number without altering the value of the fraction.
    (2.) Adjectives may be divided into three classes—quantity, quality, and distinction.
    (3.) Air contains oxygen, nitrogen, aqueous vapour, and carbon dioxide.

    Outline the method by which you would try to teach it.
11. Draw up a list of twenty object lessons suitable for Standard III. (*a*) in a town, *or* (*b*) in the country.
12. What would you do with a child who told you a falsehood?

### 4. Geography.

(100 marks. 1½ hours. You may answer *six* questions, including number one if you can.)

1. Draw a sketch-map of the Dominion of Canada, marking the provinces and territories, ten important towns, the course of the Canadian Pacific Railway, and the course of the Mackenzie.
2. From what ports of the empire do we obtain wheat, tin, wood, meat (live, canned, or frozen), fruits?
3. Describe the course of any great steamship line, pointing out the stopping places, the time occupied, and the fares.
4. Describe the position and explain the importance of Winnipeg, Buluwayo, Wei-hai-wei, Trieste, Colombo, Singapore.
5. Describe, with a sketch-map, the course of one of the following railways:—(*a*) Union Pacific; (*b*) Trans-Siberian; (*c*) Cape to Cairo.
6. Write what you can about the island of Jamaica, with reference especially to size, climate, and productions.
7. Where are the following industries carried on: ostrich farming, lumbering, diamond mining, pearl fishing, and sealing? Give a brief description of *one* of them.
8. Where do the following peoples live, and what are their occupations: Maoris, Armenians, Swazis, Cingalese, Sikhs, Berbers?
9. Write eight or ten lines each about *two* of the following: the monsoons, geysers, land and sea breezes, trade winds, hurricanes.

### 5. History.

(100 marks. 1½ hours. Answer *two* questions from each section.)

*Section I.*

1. What circumstances led to the decay and final extinction of the Feudal System?
2. Give a short account of the development of the House of Commons from its position in the thirteenth century till the present time.
3. Take one of the following wars and give (*a*) the causes, (*b*) the chief events, and (*c*) the results: the Dutch war in the time of Cromwell, the War of the Austrian Succession, the Seven Years' War, the Crimean War.
4. With what great movements were the following connected: John Howard, William Wilberforce, Robert Peel, William Paterson, George Washington? Write a brief life of one.

*Section II.*

1. Distinguish clearly between the different systems of government in the colonies.
2. What part have chartered companies played in the extension of the Empire?
3. What do you know of the history of New Zealand or of Tasmania?
4. Write about twenty-five lines on *one* of the following subjects:—
   (*a*) The Duke of York's Tour.
   (*b*) The Probable Future of South Africa.
   (*c*) The Advantages of Federation.

### 6. Composition.

(75 marks. 1 hour.)

Write a short essay on *one* of the following subjects:—
(*a*) The Character of Julius Cæsar as Depicted in the Play.
(*b*) The Influence of Climate on Character.
(*c*) "Familiarity breeds contempt:" how far is this true?

### 7. English Language and Literature.

(100 marks. 2½ hours. All candidates must answer question one, and may answer five others. No abbreviation of less than three letters is to be used in parsing or analysis.)

1. Analyse *one* of the following passages, and parse the words in italics:—

(*a*) "*With meditating* that she must die once,
I have the patience *to endure* it now.
*Even so* great men great losses *should* endure.
I have as much of this in art as you,
But yet my nature could not bear it so."

(*b*) "But when contending chiefs blockade the throne,
Contracting regal power *to stretch* their *own*;
When I behold a factious band *agree*
*To call it freedom*, when themselves are free,—
Fear, pity, justice, indignation start,
Tear *off* reserve, and bare my swelling heart."

2. Write explanatory notes on the following:—"Orts and imitations," "monstrous quality," "the posture of your blows," "Hybla bees," "men cautelous."
3. Write a character of one of the persons in the play. In what metre is it written? Write two or three lines and scan them.
4. By whom, of whom, and on what occasions were the following uttered?—
   (*a*) "His coward lips did from their colour fly."
   (*b*) "A woman well reputed Cato's daughter."
   (*c*) "There are no tricks in plain and simple faith."
   (*d*) "There is a tide in the affairs of men."
   (*e*) "Why old men fool and children calculate."
   (*f*) "I trouble thee too much, but thou art willing."
5. Give in your own words Goldsmith's summary of the topic, "What constitutes happiness?"
6. Write explanatory notes on the following:—"Campania's plain," "my earliest friend," "school-taught pride," "the pregnant quarry," "gestic lore," "rampire's artificial pride."
7. To what school of poetry does Goldsmith belong? Mention the chief writers who were contemporary with him, giving in each case their chief works.
8. Point out some of the chief changes produced in the language by the Norman Conquest.
9. By what means can you decide whether a word is of Anglo-Saxon origin?
10. Give the derivation and exact definitions of the following terms:—Adjective, relative, verb, co-ordinate, syntax, pronoun, imperative, disjunctive.
11. Prepare the outline of a first lesson on the preposition.
12. What are the chief "figures of speech"? Define them, and quote examples of their use.

### 8. Arithmetic.

(100 marks. 2 hours. Answer *three* questions in each section.)

*Section I.*

1. Explain clearly, as to beginners in fractions, why the addition of fractions with different denominators is effected by reducing each of the fractions to their least common denominator.
2. How do you know, before proceeding to divide, whether a vulgar fraction can be expressed as a non-circulating decimal?
3. How would you make children understand the mistake in the following?—

$$\frac{2}{3}+\frac{1}{4}\text{ of }\frac{5}{6}-\frac{3}{8}=\frac{8+3}{12}\times\frac{20-9}{24}=\frac{11}{12}\times\frac{11}{24}=\frac{121}{288}.$$

4. Define *prime numbers*, *proportion*, *average*, *par of exchange*, *discount*, *duplicate ratio*, with examples.
5. If one number measures two others, it will measure the sum or difference of any multiples of them. Show as to a class, using both letters and numbers, the truth of this statement. Why would *one* illustration not be a *proof* of this?

*Section II.*

6. If water expands when freezing so that a cubic foot of water becomes 1·089 feet of ice, find to two places of decimals how many cubic feet of water there are in a block of ice 9 feet long, 8¾ feet broad, and 8½ feet high.
7. Reduce to their simplest forms—

$$\frac{4807}{5681};\ \frac{171}{644}\text{ of }\frac{154}{189}\text{ of }\frac{9}{152}+\frac{133}{144}\text{ of }\frac{222}{266}.$$

8. If a sixpenny loaf weighs 4·35 lbs. when wheat is 5·75 shillings a bushel, what should be paid for 98·6 lbs. of bread if wheat were 9·2 shillings per bushel?
9. Three partners gain £3650. The first advances one-third of the capital for one-fourth of the time; the second, one-fourth of the capital for one-half of the time; and the third, the remainder of the capital for the whole time. Find their respective shares of the profit.
10. By selling eight tons of tea at 1s. 6½d. per lb. a merchant loses 7½ per cent. At what price should he sell it in order to gain 10 per cent.?

*Section III.*

11. Find the exact difference between the simple and the compound interest on £8675 for four years at 6 per cent. per annum.
12. A man invests a certain sum in the ordinary stock of a railway at 80, which pays a dividend of 3¼ per cent. at the end of the year. He then sells out at 84, and invests the proceeds in a 5 per cent. stock at 125, and thus in the second year improves his income by £6, 12s. How much did he originally invest, assuming that the prices of the stocks given include brokerage, etc.?
13. A works for six days at the rate of seven hours per day. B works for five hours on the first day, and on each of the five

subsequent days one hour longer than on the preceding day. A does as much in nine hours as B does in ten hours. If the total sum paid to A and B as wages for the week be £4, 2s. 6d., how much should A receive?

14. Find the times between three and four o'clock when the angle between the hands is one-third of a right angle.

15. A rectangular stone basin, the bottom and sides of which are composed of slabs 3 inches thick, measures externally 8 feet in length, 2 feet 6 inches in breadth, and 3 feet in height. How many gallons will it contain? (One gallon occupies ·16 cubic foot.)

### 9. Domestic Economy.

(80 marks. 1½ hours. Candidates are not allowed to answer more than *one* question in each section.)

*Section I.*

1. State the arguments for and against a purely vegetable diet. What kinds of food are best adapted to (1) hot, (2) cold, and (3) temperate climates?

2. Explain the process of mastication, and describe the common causes of indigestion.

*Section II.*

1. Distinguish the different materials used for clothing, as conductors or non-conductors of heat.

2. Explain the different processes of washing (*a*) a calico shirt, (*b*) a flannel dressing gown, and (*c*) a print dress respectively.

*Section III.*

1. Give the principal rules for keeping a dwelling in cleanliness, healthiness, and comfort.

2. When and how does air cease to be "fresh"? Explain clearly the effects of a poisoned atmosphere.

*Section IV.*

1. Explain the effects on the body of wearing wet or damp boots and clothing.

2. Why is exercise necessary to health? What are some of the most effective forms of exercise?

*Section V.*

1. What are the qualities desirable in a nurse?

2. Mention the ordinary causes of the beginning of fevers, and explain the practice of "isolating" infectious patients.

*Section VI.*

1. Describe the present facilities for investing small sums of money, mentioning both interest and security. Give instances of investments to be avoided on the ground of *risk*.

2. What proportion of income should, as a rule, be spent in house rent? Explain the nature of building societies and of fire and life insurance.

# OUR CERTIFICATE COURSE FOR 1902.

BY GEORGE COLLAR, B.A., B.SC.,
*Head-Master of the Stockwell Pupil Teachers' School.*

## TEST QUESTIONS ON LAST MONTH'S WORK.

### Theory of Teaching.

1. Describe your plan of arranging notes of lessons. How should notes on a geography lesson differ from those on an object lesson?

2. Write notes of (*a*) a dictation lesson; (*b*) a lesson on money (Standard III.); and (*c*) on the reign of James the Second.

### Arithmetic.

1. Give all the information you can, from inspection, about the decimals produced from the following fractions:—$\frac{1}{4}$, $\frac{1}{17}$, $\frac{7}{12}$, $\frac{3}{11}$, $\frac{1}{13}$.

2. Give correct to four decimal places—
   (*a*) The product of 47·427963 and 2·414379.
   (*b*) The quotient of 219·436179 by 56·2978621.

### English Literature.

1. Give a summary of the third Act of *Macbeth*.

2. Explain the following phrases, and give their context:—
   (*a*) "Ay, in the catalogue ye go for men."
   (*b*) "He hath a wisdom that doth guide his valour To act in safety."
   (*c*) "We have scotched the snake, not killed it."
   (*d*) "There's not a one of them but in his house I keep a servant fee'd."
   (*e*) "Stand not upon the order of your going, But go at once."

### Geometry.

Men.—1. If a straight line be drawn parallel to one side of a triangle, it will cut the other sides, or those sides produced, proportionally. Also state and prove the converse.

2. Give definitions of *proportionals*, *homologous terms*, *mean proportional*.

Women.—In every triangle the square on the side subtending an acute angle is less than the squares on the sides containing that angle by twice the rectangle contained by either of those sides, and the straight line intercepted between the perpendicular let fall on it from the opposite angle and the acute angle.

### Trigonometry.

Show that—

(i) $\frac{\cos 2A - \cos 4A}{\sin 4A - \sin 2A} = \tan 3A.$

(ii) $\sin A(1 + \tan A) + \cos A(1 + \cot A) = \sec A + \operatorname{cosec} A.$

(iii) $\tan A + \cot A = \frac{2}{\sin 2A}.$

### French.

1. Comment on the following feminine forms:—maligne, Turque, paysanne, secrète, longue, ambiguë, impératrice.

2. Translate into French:—

When one of the family was in trouble or sickness, all the rest went to visit the unfortunate member, usually at the same time, and did not shrink from uttering the most disagreeable truths that correct family feeling dictated. If the illness or trouble was the sufferer's own fault, it was not the practice of the Dodson family to shrink from saying so.

3. Translate into English:—

Le second hiver fut moins paisible que le premier. La patiente résignation avec laquelle j'avais d'abord travaillé à rendre mon existence possible au milieu de l'isolement et des privations m'abandonna l'année suivante. L'indolence et les rêveries de l'été avaient changé la situation de mon esprit. Je me sentais plus forte, mais aussi plus irritable, plus accessible à la souffrance, moins calme à la subir, et pourtant plus paresseuse à l'éviter. Toutes les rigeurs que je m'étais imposées avec joie me devenaient amères.

## SYLLABUS AND NOTES FOR NOVEMBER.

### English Composition.

Study the figures of speech founded on resemblance—simile, metaphor, personification, and allegory. Read an English prose book and some selections of poetry, and notice the examples of these figures that occur.

Prepare and write essays on:—
1. A Walk along the Seashore.
2. The Drama.
3. The Navy.

### Theory of Teaching.

(*a*) Study the methods of teaching reading.

(*b*) *Psychology.*—Study Dexter and Garlick, chap. viii., on the memory.

Memory may be defined as the knowledge of a fact which has been temporarily absent from consciousness, and which we recognise as having been previously present to our consciousness.

The first essential, then, is a repetition of the mental image; but the repetition must not be brought about by a repetition of the original stimulus. For example, the impression made on my mind by seeing an orange in the evening may be an exact repetition of the impression made by seeing the same orange in the morning, but the evening perception is not a memory. We must not only have an image in the mind *like* one that was there before, but we must have a conviction that it is identical with the previous one. We see a dish of fruit in the morning, and when we recall that dish to mind in the evening, our mental image of it may differ in several important particulars from the one that was there in the morning; but if we believe it is the same one, which has merely been dormant in the interim, we are exercising the memory. It is evident, then, that the two chief factors in memory are *retention* and *power of recall*. The retentive power of the mind is one of its fundamental physical characters, and individual minds differ in this point just as individual bodies differ in height. It may vary with the state of health, but the

teacher can no more increase the tenacity of his pupils' memories than he can increase the height of their bodies. The teacher is mainly concerned with the power of recall. Now this power of recall is dependent on, if not identical with, the power or habit of forming associations, and these associations may be either intellectual and natural or mechanical. Of the former class we may take associations founded on cause and effect, on resemblance, etc. Thus, knowing that the plague and fire of London occurred in 1665 and 1666, we are able to assign each event to its proper year by the thought that if the fire had occurred in 1665 it would have destroyed the plague germs, and the Great Plague would not have occurred at all. The so-called memory for particular subjects arises from the habit of associating together the various facts under those subjects. Thus the chemist is able to remember a vast number of facts connected with a particular body, because he associates its properties with those of similar bodies, and associates those properties with the effects they are likely to produce under given conditions. The mechanical aids to the memory consist in the association of things with others to which they have no relation. Thus, by dint of constant repetition, figures may be associated with letters, so that the figures of a date may be obtained by translating them from the letters of a word which has a more or less intellectual association with the event itself. The following is a figure-alphabet often used, the figures in the top line being represented by the letters placed under them :—

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| *d* | *n* | *m* | *r* | *l* | *sh* | *g* | *f* | *b* | *c* |
| *t* | | | | | *j* | *k* | *v* | *p* | *s* |
| | | | | | *ch* | *qu* | | | *z* |

If we wish to remember a date, we have to work out a word containing, in order, the letters representing the figures of the date, and associated as intimately as possible with the event. For instance, if we wish to remember the date of the execution of Charles the First—1649—we must find a word containing the letters under 1, 6, 4, and 9 respectively; or, as we are not likely to go wrong in the thousands place, we may neglect the 1. *Sharp* contains letters under 6, 4, and 9; so if we say over, "King Charles was beheaded by an axe that was *sharp*," we can get the date 1649. We have explained this system at length in treating of memory, but we think that if the number of dates to be remembered is small (and the knowledge of history is not identical with ability to say off dates), it is more trouble to learn the figure-alphabet and search for suitable words than to master them without such assistance.

We must not forget the importance of putting things in their proper perspective when they are recalled; and when events are "at a distance behind the picture plane" of the memory, many details should be omitted. One quality, therefore, of an excellent memory is that it enables us to recall the essential features and forget the non-essential details. "We thus reach the paradoxical result," says M. Ribot, "that one condition of remembering is that we should forget. Without totally forgetting a prodigious number of states of consciousness, and momentarily forgetting a large number, we could not remember at all. Oblivion, except in certain cases, is thus no malady of memory, but a condition of its health and life."

(*c*) Locke's *Thoughts*, Sections VIII. and IX.—Locke returns to the consideration of rewards and punishments in connection with the treatment of children. Some of his sayings in these sections might be regarded as aphorisms; but, like most aphorisms, they have their limitations. "None of the things they [that is, children] learn should ever be made a burden to them, or imposed upon them as a task." Now, although the teacher should endeavour to make school work as pleasant as possible for the pupils, he should yet teach them that it is a duty, and that, like other duties, it has merit attaching to its fulfilment. So with respect to time Locke says: "He that loves reading, writing, music, etc., finds yet in himself certain seasons wherein those things have no relish to him; and if at that time he forces himself to it, he only pothers and wearies himself to no purpose. So it is with children." This should be placed among the "thoughts" of Locke which are more useful to private tutors than to class teachers and schoolmasters. The time-table should be so arranged as to put each lesson in the hour when the children, *as a rule*, are most apt at it. But although a private tutor might arrange his lessons to suit the fancy of his one pupil, yet the class teacher must work by a time-table; and the mere fact that a class of fifty children would not be unanimous in their "relishes" causes Locke's remark to be useless in such a case. Again, "they [the children] love to be busy, and the change and variety is that which naturally delights them." This is very true of all children, and the younger they are the more true is the last part of the remark. "Get them but to ask their tutor to teach them." The position of the pupil as an inquirer is too often forgotten. A teacher who induces and fosters an inquisitive state of mind in his pupils is far better than one who tries to press information upon them. Notice what Locke says about keeping a child too long at a subject of work. The paragraph on obstinacy contains much food for thought. Look at both sides of the case, and you will not always agree with Locke; but he is undoubtedly right in his view that *when* chastisement is necessary it should be effective. "They love to be treated as rational creatures sooner than is imagined." If the teacher is careful not to put himself in a false position, he will seldom have cause to regret setting the reason of his course before his pupils. The chapter on the qualifications of a tutor will prove very interesting to our readers, and requires no explanation. Make a summary of it.

### English Literature.

Prepare in detail the fourth Act of *Macbeth*.

Scene 1, line 1. *Brinded* = brindled—that is, striped, tabby.

2. *Hedge-pig* = hedge-hog.

12. *Sweltered venom.* Small glands on the toad's skin secrete an acrid fluid, which has led to the toad being regarded as venomous.

14. *Newt.* The *n* originally belonged to the article, but *an ewt* became *a newt*. The Early English form was *ewte*, from A.S. *efeta* = a lizard. The newt is still often called the *eft*.

15. *Adder's fork.* The adder is the only poisonous British snake. The snake's *tongue* is *forked*.

*Blind-worm's sting.* The blind-worm, or slow-worm, is really a lizard without legs. It has no "sting," and is perfectly harmless, though its resemblance to a snake often leads to its destruction.

28. *Slivered*, cut off. A small branch was called a "sliver." (Compare "An envious *sliver* broke"—*Hamlet*, Act IV., Scene 2, line 174.)

59. *Germens*, seeds, origins, or sources.

64. *Nine farrow* = her litter of nine.

96. *Bodements* = forebodings.

Scene 2, line 11. *Her young ones in her nest.* This is a nominative absolute. Supply "being"—"her young ones being in her nest."

19. *Hold rumour*—that is, take hold of rumour. Paraphrase: "When we accept rumours agreeing with what we fear." The dialogue between Lady Macduff and her son shows a strange mixture of childish simplicity and smartness. The comparison of himself with the birds is pretty enough; but the suggestion that "there are liars and swearers enough to beat the honest men and hang up them," and the statement that he would soon have a new father if Lady Macduff did not weep for her husband, show too much knowledge of the "world" to suit the lips of a child.

Scene 3, line 10. *To friend* = to be a friend. (Compare "he took her to wife"—that is, to be his wife.) A similar idiom occurs in line 37—"the rich East *to boot*." Boot is a noun, meaning improvement, something better. It is from the same root as "better." (Compare "There is no boot"—*Richard II.*, Act I., Scene 1, line 165; and, again, "Do *bote* to brugges that to broke were"—*Piers Plowman*—that is, mend bridges that were broken.)

88. *Foisons*, a doublet with *fusi n;* a pouring out, plenty.

127. *Scarcely have coveted.* Paraphrase: "I have hardly any desire to obtain what I have a right to (much less to obtain the goods of others)."

142. *That stay his cure.* From the time of Edward the Confessor ("the king" referred to in line 140) to that of Queen Anne it was believed that scrofula could be cured by the touch of the sovereign; hence it was called "king's evil." Dr. Johnson, when two and a half years old, was "touched" by Queen Anne (1712). He is said to have been the last person in England "touched" for king's evil.

153. *A golden stamp.* This is an anachronism, as the practice of presenting a coin to the person touched was introduced by Henry the Seventh.

155. *To the succeeding royalty.* In 1745 the Young Pretender claimed to have cured a young girl of scrofula by touching her, and thus proving that the "Divine Right" had descended to him.

170. *The dead man's knell.....who.* Funerals have become so common that when the funeral bell is tolled no one asks for whom it is ringing. *Who*, of course, should be *whom*, as it is in the objective case.

187. *Doff* = to take off—literally, do off; so to "doff" (do off) one's cap is to take it off, and to "dout" (do out) a fire is to put it out.

191, 192. *An older.....out* = No man that Christendom produces is an older and a better soldier.

196. *Fee-grief*, private trouble. A fee or fief was a private estate.

206. *Quarry*, killing. It is really a term used in falconry for that which the hawk carried off, and also the name applied to the part of the hunted animal given to the hounds. Some derive the word from "carry," others from Lat. *quaero*, I seek; but Skeat derives it from *cordata*, a Low Latin word for the intestines, which in its turn is from *cor*, the heart.

### Arithmetic.

*The Metric System.*—Study its history and the construction of its tables, and make a summary of its advantages.

*Practice and bills* require very little knowledge of theory, but form a good test of the "ready reckoner," for skill is shown by selecting the *shortest* way to obtain the required result. As a rule, sufficient use is not made of the method of determining the value required from that of the next higher unit, particularly when two aliquot parts are required to complete the amount, but all who have accustomed themselves to work subtraction by "complementary addition" will find this method a great help in dealing with practice sums of this type.

### History.

Owing to the want of a suitable text-book, and the difficulty of obtaining access to the necessary books of reference, we advised our readers not to attempt the course in history. A *History of Europe in Outline, 1814–1848*, by Mr. Oscar Browning, has, however, just been published by Messrs. Macmillan, and we should recommend all those who have a preference for history to procure this valuable sketch of the period set in the syllabus.

### Geometry.

Women.—Revise the second book of Euclid, and work deductions on it. We have dealt with most of the points likely to present any difficulty.

It is a very profitable exercise to trace the changes which occur in the relations between the sides as the angle in question is made to vary, and the projection of the vertex on the base consequently made to occupy positions on, at the extremity of, and beyond the base successively. Take the figures in Hall and Stevens's *Euclid*, but let ACB be the angle supposed to vary. In Fig. 2 C is obtuse, and the perpendicular AD falls beyond the base BC; consequently, reckoning toward the right, CD is positive, and the rectangle BC·CD is therefore positive, and we have—

$$AB^2 = AC^2 + BC^2 + 2 \text{ rect. } BC{\cdot}CD,$$

which is the relation proved by II. 12.

If, for the sake of simplicity, we suppose the two arms of the angle to remain of constant length, but the angle itself to increase, then AB, and consequently $AB^2$, must increase, while the only term on the right which will vary is CD, which causes a variation in the rectangle BC·CD; hence we see that by varying the angle ACB we make the square on AB vary at twice the rate at which the line CD varies. We can make ACB approach in magnitude two right angles, in which case AB becomes equal to BC + CA, and CD becomes equal to CA. The relation then is the same as that given by II. 4. Again, let ACB be diminished until it is equal to one right angle; then CD = 0, and consequently the rectangle BC·CD = 0, and the relation is—

$$AB^2 = BC^2 + AC^2,$$

which is the relation proved by I. 47.

Continuing the diminution of the angle, D moves to the left of C, as in Fig. 1, and hence CD is negative, and the rectangle BC·CD must be counted as negative; hence

$$AB^2 = BC^2 + AC^2 - 2 \text{ rect. } BC{\cdot}CD,$$

which is the relation proved in Prop. 13. Proceeding still farther, we find that the diminution of the angle ACB is accompanied by a corresponding diminution of the square on AB, and by an increase in the negative term 2 rect. BC·CD—that is, a diminution in the total value of the expression on the left. This continues until the angle ACB = 0, and AB, AC coincide with BC, when the relation becomes—

$$AB^2 = BC^2 + AC^2 - 2 \text{ rect. } BC{\cdot}CD;$$

and as either AC = AB + BC, or BC = AB + AC in that case, we meet with the condition of affairs dealt with in II. 7.

Men.—Prepare Euclid, Book VI., to end of Prop. 13.

### Trigonometry.

Prepare the general formulæ for expressing all the angles with the same sine, etc. Thus, if A be an angle in the first quadrant, its sign is positive. The supplement of A being in the second quadrant, also has a positive sign to its sine, which is equal in magnitude to sin A. In the third and fourth quadrant we have the angles $(\pi + A)$ and $(2\pi - A)$ respectively having sines equal in magnitude to sin A, but they are negative. Consequently the only angles whose sines are identical with sin A are $(\pi - A)$, and the angles formed by adding $2n\pi$ to A and to $(\pi - A)$. Now, to show that we must add A to $n\pi$ when it is even, and subtract it when odd, we employ the formula $n\pi + (-1)^n A$, since the odd powers of $(-1)$ are negative and the even powers positive.

The next important step is the solution of trigonometrical equations. In order to solve such an equation, it is necessary to transform some of the terms, so that the expressions are composed entirely of powers of one function of an angle. The value of this function can then be determined by the ordinary methods of solving algebraical equations, and the answer is given by writing the general formula for all angles having the same value for that function. Thus—

$$\sin^2\theta - 2\cos\theta + \tfrac{1}{4} = 0.$$

Substitute $1 - \cos^2\theta$ for $\sin^2\theta$.

$$\text{Then } 1 - \cos^2\theta - 2\cos\theta + \tfrac{1}{4} = 0.$$

$$\text{Or } \cos^2\theta + 2\cos\theta - \tfrac{5}{4} = 0.$$

$$\text{By factorising, } (\cos\theta + \tfrac{5}{2})(\cos\theta - \tfrac{1}{2}) = 0.$$

$$\therefore \cos\theta = \tfrac{1}{2}, \text{ or } -\tfrac{5}{2}.$$

We must reject the second value, as the magnitude of a cosine never exceeds 1 (or −1). Therefore $\theta$ is such an angle that its cosine $= \frac{1}{2}$. This is denoted by the statement $\theta = \cos^{-1}\frac{1}{2}$; and 30° is the smallest positive angle whose cosine $= \frac{1}{2}$. But all the angles whose cosines are equal to cos $\theta$ are given by the formula $2n\pi \pm \theta$. Therefore the general answer to the equation is

$$2n\pi \pm 30^\circ, \text{ or } 2n\pi \pm \frac{\pi}{6}.$$

The theory and use of logarithms should have been mastered in the study of arithmetic, or, at any rate, in the study of algebra. As we have now reached a point in which it becomes necessary in our trigonometry, this part of the work must be revised, and, if not previously attempted, must now be thoroughly mastered.

### Political Economy.

Study Mrs. Fawcett's *Political Economy*, Section III., chap. ii., on the "Wages of Labour."

The various questions connected with wages can be understood only when the fact is mastered that wages depend on the ratio of the wages fund to the wage-earning population, and can therefore only be permanently increased by increasing the former or diminishing the latter. Consequently fluctuations in the briskness of trade can only cause temporary rises and falls in wages.

Ricardo endeavoured to set up a theory of wages similar to his theory of rent. He taught that just as the rent paid for land was fixed by the produce of the least productive land in cultivation, so he held that there was a minimum in wages, which was the payment just large enough to enable the labourer to exist. The weakness of this theory of the "living wage" is that it is impossible to set any practical value on it, for many people regard as necessities what others regard as luxuries; and in dealing with the maintenance of labourers, we have to consider the maintenance of children in the case of those with families, but not in others. Still the theory is of great importance as a hypothesis. It enables us to appreciate the true relation between wages and the price of food, and also to see how the interests of the labouring classes are advanced by the observance of the Sabbath; for the theory shows that for the six days' work the labourer must be paid enough to maintain him for seven, so that for this cause alone the wages of an English labourer must be about 16 per cent. higher than those of a labourer in a country of Sunday labour, and this is, of course, in addition to the increased efficiency due to the day's rest.

Study the arguments for and against attempts to fix the rate of wages by law, or by rules of trades unions, etc. The section on Adam Smith's five causes of differences of wages in different employments is very important, and the student should seek for the causes of high and low wages in as many cases as possible. Notice the effect on their salaries of training by scholarships (provided either by charity of "pious founders" or by the state) of clergy, schoolmasters, etc. Also notice the effect of the competition of those who work from religious zeal or love of the work, or from other motives than those inducing ordinary competition. This is shown in the case of the salaries of clergymen, "Article 68's," and young ladies who teach the piano as a pastime or merely for pocket-money. The effect of custom on wages is shown in the payment of smaller wages to women than to men for the same work.

### French.

The grammar of the pronoun.

Read carefully *Le Roi des Montagnes*, pp. 81–116, and work Exercises 11–14.

# LONDON MATRICULATION.

JUNE 1902.

## "HELPS" FOR THE LATIN PAPERS.

BY C. J. PHILLIPS, M.A.,
*Stockwell Pupil Teachers' Centre.*

THE Latin author is Cicero, *De Senectute*. There are several very good editions, any one of which will do quite well to follow the accompanying "helps" in. Among others we recommend:—

1. *De Senectute*, edited by Dr. J. S. Reid (Cambridge University Press).
2. *De Senectute*, edited by E. S. Shuckburgh (Macmillan).
3. *De Senectute* (University Tutorial Series).

In addition to showing a competent knowledge of this special Latin book, candidates are expected—

(*a*) To be able to translate easy passages from *unprepared* authors at sight.

(*b*) To be able to answer questions on regular and irregular accidence.

(*c*) To be able to translate sentences from common English idioms into common Latin idioms.

It is proposed, then, to give the following "helps":—

*November.*—Cicero, *De Senectute*, chaps. i.–iv. Read the first four chapters through as well as you can. When you have done this, write out full answers to the following tests:—

TESTS ON CICERO (I.–IV.).

Chapter i.

1. Translate:—
   (*a*) *O Tite.....erit praemi?*
   (*b*) *Hoc enim onere.....levari volo.*
   (*c*) *Numquam igitur.....possit depere.*
2. Parse the following words:—*levasso, deportasse, absterserit, attribuito.*
3. Why are the following verbs in the subjunctive:—*vellem, uteretur, effecerit, haberet?*

Chapter ii.

1. Translate:—
   (*a*) *Saepenumero admirari.....dicant sustinere.*
   (*b*) *Qui enim.....obrepit?*
   (*c*) *Sed tamen necesse.....repugnare?*
   (*d*) *Atqui, Cato.....possimus.*
   (*e*) *Volumus sane.....quale sit.*
2. Parse:—*adeptam, qui* (*qui enim citius*), *istuc.*
3. Translate into Latin:—
   (*a*) Cato said that nothing which the necessity of nature brought to men could be an evil.
   (*b*) Laelius asked Cato by what means he had been able to endure the advance of old age.

Chapter iii.

1. Translate:—
   (*a*) *Faciam ut potero.....coli soliti.*
   (*b*) *Ut Themistocles.....fuisses.*
2. Parse:—*accusandum, usu, assecutum.*
3. Put into Latin:—
   (*a*) Laelius replied that it was as Cato had said.
   (*b*) Themistocles was once asked whether he had become famous by his own or his country's glory.

Chapter iv.

1. Translate:—
   (*a*) *Anno enim.....ad Tarentum.*
   (*b*) *Nec vero in armis.....ferri.*
   (*c*) *Cuius sermone.....neminem.*
2. Explain the phrases:—*suasor legis Cinciae; optimis auspiciis.*
3. Put into Latin:—
   (*a*) Salinator said that it was through him that Fabius had recaptured Tarentum.
   (*b*) When he is dead, there will be no one from whom we can learn Roman literature.

*Unprepared Translation.*—Ability to translate unprepared passages at sight can only be acquired by persistent practice. Some good books to use for this purpose are:—

1. *Exercises in Unseen Translation in Latin*, edited by Welch and Duffield (Macmillan).
2. *Unseens* (University Tutorial Press).

For November, it would be well to take the first five connected pieces in the book you are using, and try to write them out in English.

*Grammar* (Regular and Irregular Accidence).—The best book for this purpose will be *The University Tutorial Latin Grammar.*

For November, prepare the regular and irregular nouns.

For November, we begin with a very common and very important idiom—the accusative with the infinitive (*oratio obliqua*). Simple sentence—"He is wise," *Is est sapiens.* Now suppose that we have to make this simple sentence dependent upon some verb or other phrase—for example, "I know that he is wise." How are we to put this into Latin? Notice that in English we may do it in either of two ways—(1) "I know that he is wise;" or (2) "I know him to be wise." This second method is the only one used in Latin. Thus in English we say: "He says you are ill;" "It is evident that he will come." In Latin we must translate as if we said: "He says you to be ill;" "It is evident him to be going to come"—*Dicit te non valere; Manifestum est eum venturum esse.* Clearly, then, you must first make quite sure that you know the forms of the infinitive mood active and passive. When you feel confident that you can do simple sentences involving this construction, you should pass on to notice the following *three difficulties*:—

1. How should you translate such a sentence as, "He said he saw you"? In English these words are ambiguous. They may mean—(*a*) "He said (at a certain moment) that he saw you (at that same moment);" or (*b*) "He said (at a certain moment) that he had seen you (on some previous occasion)." If you think the sentence means (*a*), then you must say in Latin—(*a*) *Dixit se te videre*, "He said himself to see you." If you think it means (*b*), then you will say—(*b*) *Dixit se te vidisse*, "He said himself to have seen you."

2. Sentences requiring the future infinite passive—for example, "I believe Caesar will be conquered by Pompeius." Turning this round into the Latin form, you will say, "I believe Caesar to be about to be conquered by Pompeius;" and you will write, *Credo Caesarem victum iri a Pompeio;* and this will be correct. But the examiner will probably want to find out whether you really understand this particular phrase *victum iri*, and he will set you such a sentence as, "Caesar is said to be going to be conquered by Pompeius." Possibly you would write, *Caesar dicitur victum iri a Pompeio.* This, however, is quite meaningless. The use of the future infinitive passive is extremely idiomatic, and very difficult for a beginner to understand; but it has been set in London Matriculation, and may be set again in June. There is, in reality, no form in the Latin verb for the future infinitive passive. It ought to consist—by analogy with the corresponding tense of the active voice—of a future participle passive and the verb *esse.* But there is no form for the future participle passive. To make up for this want, the Latins used a complicated and idiomatic phrase. It consists of two words, one of which is *iri*, and the other is the *active* supine of the verb, for which the form is required—for example, *amatum, victum*, etc., which mean "to love" and "to conquer." Now what is *iri?* It is the present infinitive passive (used impersonally) of *eo* (=I go). If a Roman wanted to say that some one was going, without wishing to specify who was going, he used to say *itur*, "there is a going;" so, too, *itum est*, "there was a going." *Iri* is the infinitive form of this phrase. Thus, *Dicitur Caesarem victum iri a Pompeio* literally means, "It is said that there is a going by Pompeius to conquer Caesar." If you try to examine the sentence, *Caesar dicitur victum iri a Pompeio*, you will see that it has no literal meaning at all. We must say then, *Dicitur* (it is said) *iri* (that there is a going) *a Pompeio* (by Pompeius) *victum* (to conquer) *Caesarem* (Cae-ar).

3. Suppose that we have such a sentence as this, "Caesar said that Balbus, who fought against Pompeius, was a brave man." Here again the English is ambiguous. Are the words "who fought against Pompeius" part of what Caesar said, or are they put in by the person quoting Caesar's remark to explain which Balbus Caesar meant? If they are part of what Caesar said, then the verb for "fought" in Latin must go in the subjunctive mood—*Caesar dixit Balbum, qui contra Pompeium* pugnavisset, *virum fortem esse.* If Caesar originally said simply, "Balbus is a brave man," and the person quoting this remark put in on his own authority a parenthesis—"who fought against Pompeius"—to explain which Balbus Caesar had meant, then the verb for "fought" is put in the indicative—*Caesar dixit Balbum, qui contra Pompeium* pugnaverat, *virum fortem esse.*

*Test Sentences.*

Put into Latin:—

1. Cicero thought that he had saved his country, and that he was loved by his fellow-citizens.

2. We have been informed that the province of Asia is going to be handed over to Lucullus.

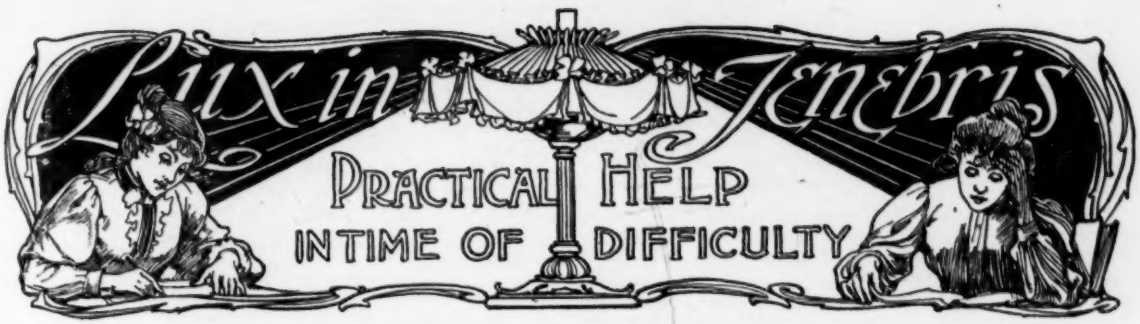
3. I hope your daughter will read the letter when she receives it.

Translate into English as exactly as possible:—

(*a*) *Curio legionem quartam, quae in urbe remansisset, optimam esse credidit.*

(*b*) *Curio legionem quartam, quae in urbe remanserat, optimam fuisse credidit.*

*Answers to* ALL *these tests will be given next month.*




# OUR QUERY COLUMN.

## RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

*R.U.I.* (B.A.).—Smith's *Conic Sections;* Nixon's *Euclid*, Book XI.; Casey's *Sequel to Euclid;* Loney's *Plane Trigonometry;* M'Clelland and Preston's *Spherical Trigonometry;* Hall and Knight's *Higher Algebra;* Edser's *Differential and Integral Calculus for Beginners.*

*R.U.I.* (Mathematics, Physics).—Loney's *Mechanics;* Besant's *Hydrostatics;* Godfrey's *Astronomy;* Airy's *Optics*, or any Elementary Optics.

*And. S. R.* (B.Sc., Final).—Will reply by post.

*X.Y.Z.*—Regret we cannot send solutions by post.

*Carlo.*—Two series of powers of the variable represent the same algebraical function; under what circumstances can their respective coefficients be equated?

If $x + x^{-1} = z$, express $x^n + x^{-n}$ in a series of powers of $z$ when $n$ is a positive integer. (London B.Sc. Exam., 1898.)

The coefficients of the same power of the variable in the two series can be equated if the two series be equal to one another for all values of the variable for which the series are convergent. (For a proof of this statement see *Treatise on Algebra*, by C. Smith, Art. 281.)

If $x + x^{-1} = z$, then the identity

$$(1 - yx)\left(1 - \frac{y}{x}\right) \equiv 1 - y(x + x^{-1}) + y^2$$

may be written $(1 - yx)(1 - yx^{-1}) \equiv 1 - y(z - y)$.

Hence $\log(1 - yx) + \log(1 - yx^{-1}) \equiv \log\{1 - y(z - y)\}$.

$$\therefore yx + \frac{1}{2}y^2x^2 + \frac{1}{3}y^3x^3 + \ldots + yx^{-1} + \frac{1}{2}y^2x^{-2} + \frac{1}{3}y^3x^{-3} + \ldots$$

$$\equiv y(z-y) + \frac{1}{2}y^2(z-y)^2 + \frac{1}{3}y^3(z-y)^3 + \ldots + \frac{1}{n}y^n(z-y)^n + \ldots$$

In this identity we may equate the coefficients of $y^n$. On the L.H. side the coefficient of $y^n$ is $\frac{1}{n}(x^n + x^{-n})$; the coefficient of $y^n$ on the R.H. side is obtained by collecting the coefficients of $y^n$ from the expansion of the term $\frac{1}{n}y^n(z-y)^n$, and from the expansions of the terms which precede this.

In the term $\frac{1}{n}(z-y)^n y^n$ the coefficient of $y^n$ is $\frac{z^n}{n}$.

$$\ldots \frac{1}{n-1}(z-y)^{n-1}y^{n-1} \ldots\ldots - \frac{1}{n-1}(n-1)z^{n-2}$$

$$\ldots \frac{1}{n-2}(z-y)^{n-2}y^{n-2} \ldots\ldots \frac{1}{n-2}\frac{(n-2)(n-3)}{1\,.\,2}z^{n-4};$$

and hence in the general term, $\frac{1}{n-r}(z-y)^{n-r}y^{n-r}$, the coefficient of $y^n$ is $\frac{(-1)^r(n-r)(n-r-1)\ldots(n-2r+1)}{\underline{|r}}z^{n-2r}$.

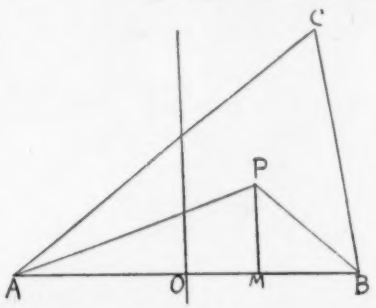
Hence

$$x^n + x^{-n} = z^n - nz^{n-2} + \frac{n(n-3)}{1\,.\,2}z^{n-4} - \ldots$$

$$+ (-1)^r \frac{n(n-r-1)(n-r-2)\ldots(n-2r+1)}{\underline{|r}}z^{n-2r} + \ldots$$

*S. Markham.*—We confirm your result—namely, 45. The number given in book must be a misprint.

*Discipulus.*—Given the base of a triangle and the sum of its sides, prove that the locus of the centre of the incircle is an ellipse. (Loney's *Co ordinate Geometry.*)




Let AB be the fixed base, and P the centre of the incircle for any position of the triangle ABC. Then the angles at A, B are bisected by PA, PB. Draw PM perpendicular to AB.

Take as axes AB and the perpendicular to it through its middle point O, and let $x$, $y$ be the co-ordinates of P.

We are given AB ($= c$, suppose), and the sum of AC, CB ($= a + b$, suppose).

Hence we are given $s$, where $s = \frac{a+b+c}{2}$.

Now $\tan\frac{A}{2} = \left\{\frac{(s-b)(s-c)}{s(s-a)}\right\}^{\frac{1}{2}}$, and

$$\tan\frac{B}{2} = \left\{\frac{(s-c)(s-a)}{s(s-b)}\right\}^{\frac{1}{2}}.$$

$$\therefore \tan\frac{A}{2}\,.\,\tan\frac{B}{2} = \left\{\frac{(s-b)(s-c)(s-c)(s-a)}{s(s-a)s(s-b)}\right\}^{\frac{1}{2}}$$

$$= \frac{s-c}{s}.$$

But $\tan\frac{A}{2} = \frac{PM}{AM} = \frac{y}{\frac{c}{2}+x}$; $\tan\frac{B}{2} = \frac{PM}{BM} = \frac{y}{\frac{c}{2}-x}$.

$$\therefore \tan\frac{A}{2}\,.\,\tan\frac{B}{2} = \frac{y^2}{\frac{c^2}{4}-x^2}.$$

Hence $\frac{y^2}{\frac{c^2}{4}-x^2} = \frac{s-c}{s}$. $\therefore (s-c)x^2 + sy^2 = \frac{s-c}{4}\,.\,c^2$,

or $(a+b-c)x^2 + (a+b+c)y^2 = \frac{a+b-c}{4}\,.\,c^2$.

This is an ellipse, since $(a+b) > c$, whose vertices are the extremities of the base AB.

*R.N.*—The solution you require is not given in Casey's *Sequel to Euclid*, but you will find it in the same author's *Elements of Euclid*, under Note F (p. 307 in the seventh edition).

*Practical Reader.*—All you have to do, in the first place, is to write to the Secretary, Scotch Education Department, Whitehall, London, S.W., stating that you wish to enter your pupils for the Leaving Certificate Examinations of 1902.

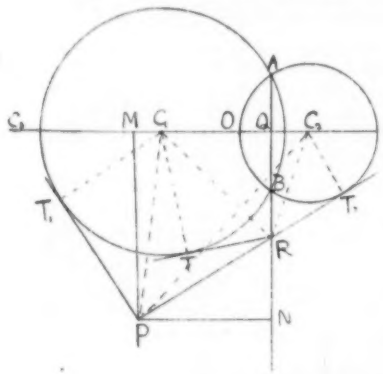
*Puzzled* (Portsmouth).—Your query will be dealt with as soon as we have an opportunity of consulting the published examination papers.

*Indice.*—The best books for your purpose are Cartwright's *Section II. Physiography* (T. Nelson and Sons), and Gall's *Easy Guide to the Constellations* (Gall and Inglis). We will try to find space for an article on the subject in an early issue of this journal.

*Zeta.*—If P is any point on the plane of two intersecting circles, centres $C_1$, $C_2$, and if PN is the perpendicular from P upon their chord of intersection, prove that the difference of the squares on the tangents from P to the circles is equal to $2PN \cdot C_1C_2$.

Hence (or otherwise) show that if three circles pass through the same two points, then the ratio of the tangents drawn from any point of one of them to the other two is a constant ratio.

(Oxford and Camb. School Exams., 1900.)




Let the circles $C_1$, $C_2$ intersect in AB; let P be any point in the plane of the circles, and $PT_1$, $PT_2$ tangents to the circles from P. Draw PN perpendicular to AB and PM perpendicular to $C_1C_2$, and from R, the intersection of $PT_2$ with AB, draw RT a tangent to the circle $C_1$. Let O be the middle point of $C_1C_2$, and Q the intersection of AB with $C_1C_2$. Join $PC_1$, $PC_2$, $C_2T_2$, $C_1T_1$, $C_1R$, $C_2R$, and $C_1T$.

$$RT_2^2 = RT^2 \text{ (Euclid, III. 36).}$$
$$\therefore C_2R^2 - C_2T_2^2 = C_1R^2 - C_1T^2.$$
$$\text{And } C_1T_1 = C_1T.$$
$$\therefore C_1R^2 - C_2R^2 = C_1T_1^2 - C_2T_2^2.$$

But AB cuts $C_1C_2$ at right angles in Q.

$$\text{Hence } C_1Q^2 - C_2Q^2 = C_1T_1^2 - C_2T_2^2.$$
$$\therefore C_1T_1^2 - C_2T_2^2 = (C_1Q - C_2Q)(C_1Q + QC_2)$$
$$= 2OQ \cdot C_1C_2.$$
$$\text{Again, } C_1P^2 - C_1P^2 = C_2M^2 - C_1M^2$$
$$= 2OM \cdot C_1C_2.$$

Hence, by addition,

$$(C_2P^2 - C_2T_2^2) - (C_1P^2 - C_1T_1^2) = 2C_1C_2 \cdot (OQ + OM).$$
$$\therefore T_2P^2 - T_1P^2 = 2C_1C_2 \cdot MQ$$
$$= 2C_1C_2 \cdot PN.$$

Let $C_3$ be the centre of a third circle through A and B. Then $C_3$ will lie on $C_1C_2$.

If any point $P_1$ be taken on the circumference of the third circle, the length of the tangent $P_1T_3$ from $P_1$ on that circle is zero.

But by the foregoing proof we have

$$P_1T_2^2 - P_1T_3^2 = 2P_1N_1 \cdot C_2C_3.$$
$$\text{Also, } P_1T_1^2 - PT_3^2 = 2P_1N_1 \cdot C_3C_1.$$

Hence, since $P_1T_3^2 = 0$, we have

$$P_1T_2^2 : P_1T_1^2 = C_2C_3 : C_3C_1$$
$$= \text{constant.}$$

*Solid.*—Harrison and Baxandall's *Plane and Solid Geometry* would be useful.

*Salopia.*—Having given $y^2 + z^2 + yz = a^2$, $z^2 + x^2 + zx = b^2$, $x^2 + y^2 + xy = c^2$, find an expression for $yz + zx + xy$ in terms of $a$, $b$, and $c$. (London B.Sc. Exam., 1899.)

Adding the three equations, we obtain

$$2(x^2 + y^2 + z^2) + xy + yz + zx = a^2 + b^2 + c^2,$$
$$\text{or } 2\Sigma x^2 + \Sigma xy = \Sigma a^2 \quad . \quad . \quad . \quad . \quad \text{(i.)}$$

Again, subtracting the second equation from the first, we have

$$y^2 - x^2 + (y - x)z = a^2 - b^2.$$
$$\therefore (y - x)(x + y + z) = a^2 - b^2.$$
$$\text{Similarly, } (z - y)(x + y + z) = b^2 - c^2,$$
$$\text{and } (x - z)(x + y + z) = c^2 - a^2.$$

Squaring the last three equations, and adding, we have

$$2(\Sigma x^2 - \Sigma xy)(\Sigma x)^2 = 2(\Sigma a^4 - \Sigma a^2b^2) \quad . \quad . \quad . \quad . \quad . \quad \text{(ii.)}$$
$$\text{But } (\Sigma x)^2 = \Sigma x^2 + 2\Sigma xy.$$

Hence (ii.) may be written

$$(2\Sigma x^2 - 2\Sigma xy)(2\Sigma x^2 + 4\Sigma xy) = 4(\Sigma a^4 - \Sigma a^2b^2).$$

Again, by (i.) we have $2\Sigma x^2 = \Sigma a^2 - \Sigma xy$.

$$\therefore (\Sigma a^2 - 3\Sigma xy)(\Sigma a^2 + 3\Sigma xy) = 4(\Sigma a^4 - \Sigma a^2b^2).$$
$$\text{Hence } (\Sigma a^2)^2 - (3\Sigma xy)^2 = 4(\Sigma a^4 - \Sigma a^2b^2).$$
$$\therefore (3\Sigma xy)^2 = (\Sigma a^2)^2 - 4\Sigma a^4 + 4\Sigma a^2b^2$$
$$= \Sigma a^4 + 2\Sigma a^2b^2 - 4\Sigma a^4 + 4\Sigma a^2b^2$$
$$= 6\Sigma a^2b^2 - 3\Sigma a^4.$$
$$\therefore 3(\Sigma xy)^2 = 2\Sigma a^2b^2 - \Sigma a^4.$$
$$\text{That is, } 3(xy + yz + zx)^2 = 2(a^2b^2 + b^2c^2 + c^2a^2) - (a^4 + b^4 + c^4).$$

*E.M.L.*—Find the greatest number which is such that, when 12288, 19139, and 28200 are divided by it, the remainders are all the same. (Cambridge Senior, 1896.)

Let $x$ be the required number, and suppose

$$12288 = lx + R,$$
$$19139 = mx + R,$$
$$28200 = nx + R.$$

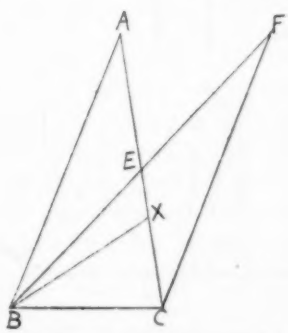
Then, by subtraction,

$$(m - l)x = 6851,$$
$$(n - m)x = 9061.$$

Hence $x$ must be the G.C.M. of 6851 and 9061—that is, the G.C.M. of $221 \times 31$ and $221 \times 41$.

$$\therefore x = 221.$$

*T. S. Knight.*—In the figure of Euclid I. 16, if the angle ABC is bisected by the line BX, meeting AC in X, prove that the median BE falls within the angle ABX so long as AB is greater than BC. (Deakin's *Rider Papers.*)




AE = EC, BE = EF, $\angle AEB = \angle CEF$.

$\therefore$ the triangles AEB, CEF are equal in all respects (Euclid, I. 4).

And CF = AB.

If AB > BC, then CF > BC.

$\therefore \angle CBF > \angle CFB$.

But $\angle CFB = \angle ABE$.

$\therefore \angle CBE > \angle ABE$.

$\therefore \angle CBE >$ half the angle ABC.

$\therefore \angle CBE > \angle CBX$.

$\therefore$ BE falls within the angle ABX, if AB > BC.

We beg to call your attention to Rule 1.

*Felix.*—Show that there are in general only two sets of solutions to the equations

$$Axy + B(x + y) + C = 0,$$
$$A'xy + B'(x + y) + C' = 0.$$

Find the conditions that there may be a third pair.

(Oxford and Cambridge School Examinations.)

Multiplying the first equation by A′, and the second by A, we obtain, on subtraction,

$$(BA' - AB')(x + y) = AC' - CA'.$$
$$\therefore x + y = \frac{AC' - CA'}{BA' - AB'} = s \text{ (say)}.$$

Similarly, by multiplying the first equation by B′, and the second by B, we obtain, on subtraction,

$$xy = \frac{BC' - CB'}{BA' - AB'} = p \text{ (say)}.$$

Then $(x + y)^2 - 4xy = s^2 - 4p$.

$$\therefore x - y = \pm\sqrt{s^2 - 4p}.$$

But $x + y = s$.

$$\therefore x = \frac{s \pm \sqrt{s^2 - 4p}}{2},$$
$$y = \frac{s \mp \sqrt{s^2 - 4p}}{2}.$$

Hence, in general, we have the following two sets of solutions:—

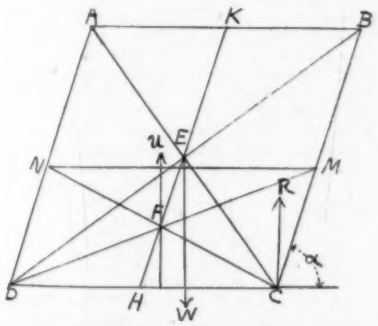
$$\begin{cases} x = \dfrac{AC' - CA' + \sqrt{(AC' - CA')^2 - 4(BC' - CB')(BA' - AB')}}{2(BA' - AB')} \\ y = \dfrac{AC' - CA' - \sqrt{(AC' - CA')^2 - 4(BC' - CB')(BA' - AB')}}{2(BA' - AB')} \end{cases}$$

$$\begin{cases} x = \dfrac{AC' - CA' - \sqrt{(AC' - CA')^2 - 4(BC' - CB')(BA' - AB')}}{2(BA' - AB')} \\ y = \dfrac{AC' - CA' + \sqrt{(AC' - CA')^2 - 4(BC' - CB')(BA' - AB')}}{2(BA' - AB')} \end{cases}$$

For a third pair there must be more than one value of $(x + y)$, or of $xy$, or, as it will turn out, of both of these—that is,

$$BA' - AB' = 0;\ AC' - A'C = 0;\ BC' - B'C = 0.$$
$$\therefore B : B' = A : A' = C : C'.$$

*Brill.*—A prismatic block of given specific gravity, whose cross section is a parallelogram ABCD, lies along the flat bottom of a tank; water is gradually admitted until its buoyancy lifts the block. Show that the block tilts around the obtuse angle of its base, and find an expression for the depth of water when tilting begins. (London B.Sc., 1900.)




Before the admission of water, the block is in equilibrium under its weight W and the reaction of the bottom of the tank. The reaction must then have a resultant R equal to W, and acting upwards along the vertical through the centre of mass of the block.

When water is admitted (to the level of the horizontal line MN, suppose) a third force is introduced—namely, the resultant fluid pressure U, which will act vertically upwards through F, the centre of mass of the immersed portion of the block. The reaction R will now be equal and opposite to the resultant of the two parallel forces U and W; and since W > U, R will act in a vertical line on the side of W remote from U.

As U increases, the position of R changes, until finally it passes through C, which is obviously its limiting position. Further admission of water will then cause the block to tilt about C.

Let AB = 2*a*, BC = 2*b*, ∠ ADC = α, 2*d* = depth of water, and σ = specific gravity of the block.

Taking moments about C, when tilting is just commencing, we have—

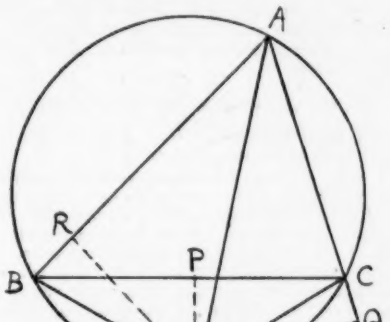
$$W(a - b\cos\alpha) = U(a - d\cot\alpha).$$
$$\therefore \frac{U}{W} = \frac{a - b\cos\alpha}{a - d\cot\alpha}.$$
$$\text{But } \frac{U}{W} = \frac{FH}{EH\,\sigma} = \frac{d\,\text{cosec}\,\alpha}{b\sigma}.$$
$$\therefore \frac{d\,\text{cosec}\,\alpha}{b\sigma} = \frac{a - b\cos\alpha}{a - d\cot\alpha}.$$

Solving the last equation for *d*, we obtain the required expression for the depth.

*Def.*—ABC is a triangle, and O a point on the circumference of the circumscribing circle such that A and O are on opposite sides of BC. If *p*, *q*, *r* denote the perpendiculars drawn from O to BC, CA, AB respectively, show that

$$\frac{\sin A}{p} = \frac{\sin B}{q} + \frac{\sin C}{r}.$$

(S.K. Mathematics, Honours, 1895.)




$$\text{Area of triangle BOC} = \frac{BC \cdot p}{2} = \frac{BO \cdot OC \sin BOC}{2} = \frac{BO \cdot OC \sin A}{2}.$$
$$\text{Hence } BC \cdot p = BO \cdot OC \sin A.$$
$$\therefore \frac{\sin A}{p} = \frac{BC}{BO \cdot OC}.$$
$$\text{Similarly, } \frac{CA \cdot q}{2} = \frac{CO \cdot OA \sin COA}{2} = \frac{CO \cdot OA \sin B}{2}.$$
$$\text{Hence } \frac{\sin B}{q} = \frac{CA}{CO \cdot OA}.$$
$$\text{Similarly, } \frac{\sin C}{r} = \frac{AB}{AO \cdot OB}.$$
$$\text{We have then } \frac{\sin A}{p} = \frac{BC}{BO \cdot OC} = \frac{BC \cdot AO}{AO \cdot BO \cdot CO},$$
$$\frac{\sin B}{q} = \frac{CA}{CO \cdot OA} = \frac{CA \cdot BO}{AO \cdot BO \cdot CO},$$
$$\frac{\sin C}{r} = \frac{AB}{AO \cdot OB} = \frac{AB \cdot CO}{AO \cdot BO \cdot CO}.$$
$$\therefore \frac{\sin B}{q} + \frac{\sin C}{r} = \frac{CA \cdot BO + AB \cdot CO}{AO \cdot BO \cdot CO}.$$

But CB . AO = CA . OB + AB . CO, since ABOC is a cyclic quadrilateral.

$$\therefore \frac{CB \cdot AO}{AO \cdot BO \cdot CO} = \frac{CA \cdot OB + AB \cdot CO}{AO \cdot BO \cdot CO}.$$
$$\text{Hence } \frac{\sin A}{p} = \frac{\sin B}{q} + \frac{\sin C}{r}.$$

Solutions may be had by post to queries sent by *Boot*, *Civis*, *Student*, *Solus*, *Ralpho*, *Corinium*, *Def.*

# OUR FRENCH AND GERMAN PRIZE COMPETITION.

*Prize Editor*—W. T. THOMPSON, B.A. (LOND.), *French and German Honours.*

☞ ***Important to Scholarship, Certificate, and London Matriculation Students.***

WE should like to specially direct the attention of our readers to the fact that the Board of Education, in the Syllabuses for the Scholarship and Certificate Examinations 1901 and 1902, requires "no set books" for French and German. Students preparing for these examinations, as well as students for London Matriculation, could not do better than attempt month by month the pieces set for translation here. They are from the best authors, and of varied character. A competitor who does not gain a prize can derive considerable benefit from the exercise.* A study of the successful competitor's translation, and of our remarks, will help him to see where he might have done better. If desired, his paper can be returned (fully corrected) by enclosing six stamps together with a stamped and addressed envelope. Corrected papers cannot be posted until after publication of the journal.—ED.

RULES.

1. All translations should be **posted not later than November 8**, and addressed:—*Prize Editor*, Office of THE PRACTICAL TEACHER, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should adopt a pseudonym, and send name and address written on a separate piece of paper.
4. No competitor may take the prize offered more than once in three months.

## GERMAN PRIZE COMPETITION.

**A Prize of Half a Guinea** will be given for the best translation into English of the following extract:—

Also ich war, als dies Abenteuer sich ereignete, ein hoffnungsvoller Akademieschüler von achtzehn Jahren, dem Jeder, der ihm auf der Strasse begegnete, ein paar Jahre mehr gab. Nicht sowohl wegen eines verfrühten Bartwuchses, als wegen der finstern Miene, mit der ich in die Welt blickte, einer gewissen "stolzer und unzufriedenen" Manier, mit der ich die Lippe rümpfte und den dicken gelben Haarbusch von der Stirne zurückwarf. Zur Unzufriedenheit hatte ich wohl einigen Grund, zum Stolz keinen. Ich lebte in engen Verhältnissen, da meine gute Mutter nach dem Tode des Vaters mit der Pension einer Gymnasialprofessorswittwe zwei Söhne und sich selbst durchzubringen hatte. Der jüngere machte ihr die geringste Sorge. Er war schon im funfzehnten Jahr, da er die häusliche Noth erkannte, als Setzerlehrling in eine grosse Buchdruckerei eingetreten und brauchte nur wenig Zuschuss von der Mutter, bei der er wohnen blieb. Der ältere aber, der Stolz der Familie, meine Wenigkeit, schien sich selbst zu hohen Dingen berufen und knirschte in den Zügel, den seine Armuth ihm täglich fühlbar machte. PAUL HEYSE.

☞ ***A French extract will be set for competition next month.***

## RESULT OF THE OCTOBER COMPETITION.

### French.

The prize is awarded to "Désert de Retz," the pseudonym of Miss R. F. Forbes, Institut von Bismarck, Diez a. d. Lahn, Hessen Nassau.

(*Arranged in order of merit.*)

*First Class.*—Ouard, Gresset, A plain woman, Ballon d'essai, La Printanière, Kerboga, Omicron, Marwenne, Brünnhilde, Johanna, Zoe, Petit oiseau, Poverina, Hepbeo, Festina lente, Agaznog, Chemineau, C.E.M., Spes, Tartarin, Limpsfield, Anglaise, Stella Vere, The Prodigal Parson, Moffat, Hélène, Oakover, Sierre, Integer, Titania, Basing, Excelsior (New Deer), Chaos, Beth, Cygnet, Réséda, Ruddigore, A.S., Débutante, Tortoise, Morven, Nigaude, Ballin Tubber, Chips, Veritas, La plume, M.E.C., S.T.S., Lily, Anwyl Gariad, Anna, Myosotis, Conquistador, Agricola, Ravenshill, Shamrock II. (Sunderland), Duncan S., Beta, Dodo, Ephesian, Lotten, Bees, Vincit, V.H.T., Excelsior (Totnes), Liberal, Lorne, Erimus, Coligny, Aiphos, Trellis, Sweet Seventeen, P.J.R., Killarney, Kirkby, Bull-dog, Presto, Rosalind, Mary, Sherlock, Maiden City, Moonlighter, Stella, Elyas, Echinops, Kettering, Xeno, Poulton, Bristol, Kilbride, Rajah, Undine, Ishbel, Gitano, Cuckoo, Caradoc.

*Second Class.*—Zetland, Forward, Fitzpaine, S.S., Minnehaha, Hope, Eleven years, Sylvan May, Spero meliora, M.F.B., Eiram Edurtreg, Pit, Mame, Elaine, Clare Eve, Oui-dà, Llanroc, L'anglais, Marie, Anno Domini, Meg, Jersey Scholarship, Banquo, Mother Redcap, L'espérance, Crosby Ravensworth, H.M., St. Mark's, Texas, Venus, Marguerite, Diana, Micawber, Morganwg, Helen of Troy, Red Clover, Pathfinder, Veronica, Bellona, White Heather, Pratique, Ingomar, Rifle-shot, Antandros, Anvers, Nan, German Peasant, Eciwt, P.T.A.M., Mineag.

*Disqualified.*—Rule 2: Mimi, Jessica, Immer Wieder, Simagonizomenos, Ullie. Rule 3: Maisonette.

### Report.

The great majority of the competitors have grasped fairly well the drift of the extract. *Fiche* was a stumbling-block to many, and particularly to those who translated *résumé* as "resume." *La pierre de touche du talent* puzzled a few. One excessively literal competitor rendered the sentence as, "The reperusal is the gem of trial of talent." We are pleased to note a general and steady improvement in the style of the translations. One very regular competitor writes, "I owe these pieces a great deal. They have succeeded in making me try, anyway, to brighten a little my rusty French." The number of those who at one time or other gain prizes in this competition must necessarily be small; but those competitors who do not gain prizes reap at least the benefit of a gradual improvement both in their knowledge of French and in their power of translating into correct and elegant English.

### French Prize Translation.

To advance by degrees in one's knowledge of an author is an extremely profitable pleasure. For my own part, I have taken to reading slowly, and I find it of great use. I have never made a habit of reading pen in hand. All I do is to underline in pencil such passages as I wish to remember for their critical value, or admire for their art. Having read the book through, after some days, it may be, I write a summary of it on a sheet bearing the author's name, add my opinion of its literary merit, and note any parts worthy of quotation or special study. This seems to me a good plan, and many people have no other. The chief point is to go on without interruption. The impression received from a book depends on the continuity with which it is read. I fancy one ought to avoid learning by heart, for fear of exposing oneself to the drawbacks of a collection of "elegant extracts." Reading should give one a general impression, which, just because it is general, works itself into one's being. And assuredly this is no hindrance to taking notes. A man's way of reading depends on his temperament. In any case, it is always necessary to re-read. This "re-reading" is the touchstone of talent. One cannot read a commonplace work twice over. Do you want to know if a certain book is a good one? Take it up again after a few months: if it is bad, it will not bear a second reading; if it is good, you will find a new zest in it.

## * FROM OUR COMPETITORS.

"The Translation Exercise is a most valuable one, and is one of the most interesting and useful features of your excellent magazine."

"Permit me to say that I derive very considerable benefit from this competition. It has helped me rub up my French, and materially improved my English composition."

"I beg to renew the expression of my grateful thanks. This monthly translation, besides being a veritable delight, is a real godsend, rousing me to take up long-laid-aside study of French literature."

"This is but one of the many 'helps' I have derived from your valuable journal. Though I have competed only three times for your prize, I have derived great benefit from your Translation page, as I intend sitting for matriculation, and taking French as an optional subject."

# G. P. PUTNAM'S SONS' LIST.

## "Heroes of the Nations" Series.

Illustrated. Crown 8vo, cloth, 5s.

*Recent and forthcoming Volumes.*

**OWEN GLYNDWR, and the Last Struggle for Welsh Independence.** By ARTHUR GRANVILLE BRADLEY.

**OLIVER CROMWELL, and the Rule of the Puritans in England.** By CHARLES FIRTH, M.A., Balliol College, Oxford.

**RICHELIEU, and the Growth of the French Power.** By JAMES BRECK PERKINS.

**DANIEL O'CONNELL, and the Revival of National Life in Ireland.** By ROBERT DUNLOP, M.A.

**SAINT LOUIS (Louis IX. of France), the Most Christian King.** By FREDERICK PERRY, M.A., Fellow of All Souls' College, Oxford.

**WILLIAM PITT, EARL OF CHATHAM (1708-1778); or, The Growth and Division of the British Empire.** By WALFORD DAVIS GREEN, M.P.

**EDWARD I., the English Justinian.** By EDWARD JENKS, author of "Law and Politics in the Middle Ages," etc. *[Shortly.*

**HENRY V., the English Hero King.** By CHARLES L. KINGSFORD, joint author of "The Story of the Crusades." *[In Preparation.*

**THE FOREST SCHOOLMASTER.** By PETER ROSEGGER. Authorised translation by FRANCES E. SKINNER. Crown 8vo, cloth, 6s.

This is the first English version of the popular Austrian novelist's work, and no better choice among his writings could have been made through which to introduce him to the British public. It is a strange, sweet tale, this story of an isolated forest community civilised and regenerated by the life of one man. The translator has caught the spirit of the work, and Rosegger's virile style loses nothing in the transposition.

**THOMAS HENRY HUXLEY.** A Sketch of his Life and Work. By P. CHALMERS MITCHELL, M.A. With Portraits. Crown 8vo, cloth, 5s.

**THE THIRTEEN COLONIES.** By HELEN AINSLIE SMITH, author of "One Hundred Famous Americans," etc. In two volumes, crown 8vo, cloth, 12s.

It is worthy of remark that, notwithstanding the fact that so much has been written upon early American history, Mrs. Elliot is the first to bring together in one work the record of the growth and development of the Thirteen Colonies. While each colony is treated separately, the interdependence of the different commonwealths, together with the share of each in the important movements which led to the formation of the nation, are presented with a due sense of proportion.

**FAMOUS VIOLINISTS OF TO-DAY AND YESTERDAY.** By HENRY C. LAHEE, author of "Famous Singers of To-day and Yesterday." Illustrated with 10 full-page Photogravures. 16mo, cloth extra, gilt top, 6s.

**FAMOUS PIANISTS OF TO-DAY AND YESTERDAY.** By HENRY C. LAHEE, author of "Famous Singers," "Famous Violinists," etc. 16mo, cloth, gilt top, 6s.

**FIVE THOUSAND FACTS AND FANCIES.** A Cyclopædia of Important, Curious, Quaint, and Unique Information in History, Literature, Science, Art, and Nature. By WILLIAM HENRY PHYFE, author of "Seven Thousand Words Often Mispronounced," "How Should I Pronounce?" etc. 2 vols. Large 8vo, cloth.

**A NATURAL METHOD OF PHYSICAL TRAINING. Making Muscle and Reducing Flesh with Dieting or Apparatus.** By EDWIN CHECKLEY. 12mo, cloth, 2s. 6d.

**CONCERNING CHILDREN.** By CHARLOTTE PERKINS (STETSON) GILMAN, author of "Women and Economics," "In This Our World," etc. Crown 8vo, cloth extra, 6s.

A series of essays showing that rare combination of serious philosophy, keen wit, and clever satire which has made Mrs. Stetson's former books so successful.

**THE CRICKET ON THE HEARTH.**
**A CHRISTMAS CAROL.** } 2 vols.

By CHARLES DICKENS. An entirely new edition of these two famous Christmas stories. The Set will contain 24 full-page Photogravures, and numerous other illustrations, from original designs by Frederick Simpson Coburn. 2 vols., crown 8vo, cloth extra, 6s. each.

**BOYS OF OTHER COUNTRIES,** to which has been added **Studies of Animal Nature.** By BAYARD TAYLOR. New Edition, Revised. Illustrated. Crown 8vo, cloth, 6s.

**LIGHTS OF CHILDLAND.** By MAUD BALLINGTON BOOTH, author of "Sleepy-Time Stories." With Illustrations by Alice Farnsworth Drew. Crown 8vo, cloth extra, 6s.

**ON BOARD A WHALER.** By H. G. HAMMOND. With Illustrations by H. G. BURGESS. Crown 8vo, cloth, 5s.

A record of personal experience, put into story form.

*NEW LIST NOW READY*

24 Bedford Street, Strand, LONDON; and NEW YORK.



# Clough's . . . . Correspondence College . . . . .

TEMPLE CHAMBERS, LONDON, E.C.

CLOUGH'S

## PUPIL TEACHER CLASSES.

**(Candidates, First and Second Years.)**

P.T.'s who wish to fulfil the requirements of Schedule V. of the New Code should join Clough's P.T. Classes, and work carefully through the systematic courses of study and notes provided for *each* year.

Quarterly Examinations conducted. Syllabus of work provided. Full particulars on application.

☛ **New Classes now commencing.**

CLOUGH'S

## SCHOLARSHIP CLASS

Provides the best possible preparation for the important King's Scholarship Examination.

In recent years the following positions on the Scholarship List have been taken by Clough's Pupils:—

**Nos. 1, 2 (three times), 3, 4, 6 (three times), 7 (twice), 8, 9, and 10 (three times),**

besides many other places in the First Hundred.

*These results testify to the excellence of the tuition provided in this Class. No other Correspondence Class can show such a record of success.*

The special notice of Students is drawn to **Scholarships and Exhibitions** (£100, £50, £20, etc.), full particulars of which are given in Prospectus.

☛ **To secure admission to the Class for December 1902, early application is necessary.**

CLOUGH'S

## CERTIFICATE CLASSES

Provide thorough training and afford the greatest help to Students for the important Certificate Examinations, Second Year, July 1902, and the New Single Certificate Examination, July 1903.

☛ **Classes for both these Examinations are now at work. Intending Students are advised to join without delay.**

*For Prospectus, Plan, Terms, Entry Form, etc., of above Classes, write to—*

**Mr. G. B. CLOUGH,**
**TEMPLE CHAMBERS, LONDON, E.C.**

## TO FOREIGN AND COLONIAL READERS.

From time to time we have been requested by subscribers in India, the United States, and the Colonies to give them an opportunity of taking part in the French Prize Competition. The present limit of time allowed to competitors practically restricts the area of competition to the Mother Country and to Europe. In response to the repeated requests we have received, we have determined to try the experiment of setting a piece for translation, and extending the time during which translations may be received, so as to give subscribers in foreign countries, and in our more distant colonies, as Australia and New Zealand, the opportunity to compete. We have been frequently assured that if such an opportunity were given, many readers would avail themselves of it. If the number of competitors entering is sufficient to justify it, the Foreign and Colonial Competition will become a standing feature of THE PRACTICAL TEACHER.

### FOREIGN AND COLONIAL FRENCH PRIZE COMPETITION.

**A Prize of One Guinea** will be given for the best translation into English of the following extract:—

Tout comme la sensibilité, l'imagination physique—j'entends la faculté de se représenter les sensations—est demeurée tardive et obtuse. C'est une des raisons pour lesquelles les opérations chirurgicales réussissent mieux sur l'Anglais que sur l'Italien, par exemple; le premier s'inquiète et s'agite moins que l'autre. L'impassibilité des grenadiers anglais sous le feu, en Espagne, à Waterloo, à Inkermann, a été signalée avec admiration par leurs adversaires, témoins non suspects. Ils n'ont pas besoin, comme le Français, d'obscurcir par l'agitation du pas accéléré, par la "fuite en avant," les vives images de la balle qui siffle, de l'os brisé, de l'agonie tétanique. Quiconque a passé une semaine à Londres n'a pu manquer d'observer l'expédient de publicité qui consiste dans la répétition brute et indéfinie du même mot, du même nom de candidat, par exemple, affiché par centaines, sur des surfaces énormes. Notre esprit plus alerte en éprouve étourdissement et satiété. Là, ces milliers de coups répétés ne sont que juste ce qu'il faut pour percer la couche épaisse qui enveloppe chez les Anglais les organes de la perception. Notre tact littéraire souffre de rencontrer dans leurs auteurs les plus goûtés des types excessifs ou déformés, des images trop colorées, une ironie trop forte et trop corrosive.

ÉMILE BOUTMY.

RULES FOR FOREIGN AND COLONIAL READERS.

1. This competition is open to those of our readers who reside out of the British Isles.

N.B.—*This rule does not exclude Continental Competitors from entering the regular monthly competition, if they are able to send in translations to time.*

2. All translations should be addressed:—

**FOREIGN AND COLONIAL COMPETITION.**
**Editor, "The Practical Teacher,"**
**T. Nelson and Sons,**
**35 & 36 Paternoster Row, London, E.C.**

and must reach THE PRACTICAL TEACHER Office not later than **March 8, 1902.**

3. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the November number.
4. Competitors should adopt a pseudonym, and send name and address written on a separate piece of paper.


### FOR YOUNG STUDENTS.

**Le Roi des Montagnes** (About). With Introduction, Notes, Exercises, and Complete Vocabulary. By GEORGE COLLAR, B.A., B.Sc. Price 2s.

**Un Philosophe Sous les Toits** (Émile Souvestre). A Juxta-linear Translation. With Hints to Students, Explanatory Notes, etc. By A. D. J. BARRIBALL, B.A. Price 2s.

**Voyage Autour de ma Chambre** (Xavier de Maistre). With Introduction, Notes, and Exercises. By GEORGE COLLAR, B.A., B.Sc. Price 1s.

**T. NELSON & SONS, 35 and 36 Paternoster Row, London, E.C.**


## MANUAL TRAINING AT THE ANTIPODES.

IT is pleasant to record a successful development of manual work, in whatever quarter of the globe it may be. About eighteen months ago we wished God-speed to Mr. Byatt, who had been appointed by the Victorian Government to organise manual work in the colony. Mr. Byatt evidently got to work with celerity. A batch of illustrated Australian papers are just to hand showing an exhibition of work executed in his classes at Melbourne. Commenting on the work, *The Leader* says:—

"There is always something more or less fascinating about the idea of manual training. Its past consists of all the toys, primitive or æsthetic, we ever possessed; its immediate future is technical education; and it finally loses itself in the somewhat awesome regions of science as applied to art. We don't trouble to realise all this as we go over the Sloyd exhibition which has lately been interesting so many good people at the Queensberry Street State School, North Melbourne. The moralising lingers somewhere in the back of our minds, however; and whether it be a soap-box we are called upon to handle, or a sugar-scoop to admire, we never once imagine that the rising generation is really being taught to make soap-boxes and sugar-scoops. He is learning the nature of timbers, the uses of tools, accuracy of eye and of hand, patience, perseverance, and a dozen and one other things to which the manufacture of various useful articles is merely incidental. He—and in this case 'he' embraces 'she'—is also learning, by means of cubes, the ethics of form, lightness of hand, and accuracy in manipulating such materials as cardboard, paper, canvas, and other fabrics. As illustrative of this, we were shown excellently-made workboxes, writing-cases, portfolios, and needlebooks—all of them the work of the pupils. In every instance the result of training in the manipulation of the various items which go toward the construction of these things was plainly evident. Nothing was 'scamped.' To the smallest detail the work had been faithfully done. And yet merely as work it represented very little. What represented, however, a quite incalculable deal was the idea of the system and order that had been inculcated in the child mind before it was capable of accomplishing any such work at all. And what holds good in the preparatory part of Sloyd work also holds good later on. In the woodwork department, the first thing the pupil is told to do is to make, according to a copy, a small deal wedge, such as you would place between window sashes to prevent their rattling. You look at the wedge, and you quite likely smile at the idea of so easy a thing being given as a lesson. In which case your best plan is to try making a copy of it yourself. You will learn infinitely more in the process than the art of making wedges. Chiefly, perhaps, you will learn how tremendously handicapped you are by the possession of an unskilled hand, an untrained eye, and a scandalising shortage of patience, and you will gain on the spot a respect for the Sloyd system which will do you no harm whatever."—*The Practical Teacher's Art Monthly.*


## THE PRACTICAL TEACHER'S ART MONTHLY FOR NOVEMBER

CONTAINS:—

**Well-Known Pictures: Webster's "Village Choir."** By W. E. SPARKES.

**Daily Rounds of a Drawing Inspector.**

**Geometrical Drawing, May Examination, 1901.** With full Solutions.

**How to Illustrate the Geography Lesson on the Blackboard.** With many Illustrations.

**Whitehall and South Kensington.**

**Full Page of Model Drawing.—I. The Circle.**

**Hints on Sketching from Nature: Sketching in Oils.** By R. T. MUMFORD, Exhibitor, Royal Academy.

**Some Bird Studies for Schools.**

**Woodwork for Evening Schools.** With Full Page of Illustrations. By B. F. MASON.

**Suggestions for Manual Training in Public Elementary Schools.**

**T. NELSON & SONS, 35 and 36 Paternoster Row, London, E.C.**

*Fresh Arrangement of the*

# NEW WORK ON ALGEBRA.

By C. H. FRENCH, M.A., and G. OSBORN, M.A.,
*Mathematical Masters at the Leys School, Cambridge; formerly Scholars of Emmanuel College, Cambridge.*

**I.—ELEMENTARY ALGEBRA (to Logarithms).** With Answers, 4s. 6d.; without Answers, 3s. 6d.

**II.—FIRST YEAR'S ALGEBRA (to Factors).** With or without Answers, 1s. 6d.

*The Academy:* "Always correct." *The Practical Teacher:* "Most carefully done." *The Journal of Education:* "Wonderfully clear." *The School World:* "A very useful class book."

SPECIMEN COPIES.—The Publishers will be glad to receive applications from Teachers.

London: J. & A. CHURCHILL, 7 Great Marlborough St.

# FREE CAMERAS FOR TEACHERS' DISPOSAL.

The Directors of Kodak, Limited, are prepared to place

A BROWNIE KODAK

at the free disposal of any teacher who undertakes to arrange to award the same as a prize in any class competition. Applicants should give full name and address of their schools, and state average number of pupils in attendance.

KODAK, LIMITED,
43 Clerkenwell Road, E.C.

CHAMBERS'S

# GEOGRAPHICAL READERS

Of the Continents.

*The Practical Teacher* says:—"Splendid series of Geographical Readers.... *beau ideals* of what such books ought to be."

These readers have been specially prepared in accordance with the suggestions made in the Specimen Schemes of Instruction issued by the Board of Education. They are written in a bright and interesting manner are not overburdened with detail, and are furnished with a wealth of Pictures and Maps executed both in colour and in black-and-white

EUROPE AND THE BRITISH ISLES. 208 pp. 1s. 6d.
"Written in an easy and interesting style, and supplied with plenty of illustrations. The coloured pictures will certainly be very attractive to children."—*Educational Times.*

ASIA - - - - - - - 224 pages. Price 1s. 6d.
"In every way the *beau ideal* of what a reading book should be."
—*Teachers' Aid.*
"Most interestingly written and profusely illustrated with pictures, both coloured and uncoloured."—*School Guardian.*

AFRICA - - - - - - 224 pages. Price 1s. 6d.
"Information is here made genuinely interesting."
—*Sheffield Independent.*

AMERICA - - - - - - 216 pages. Price 1s. 6d.

## Chambers's Geographical Manuals

Of the Continents.

Illustrated by Coloured and Uncoloured Maps.

No. 1—Europe and the British Isles - 56 pages. Price 4d.
No. 2—Asia - - - - - - - 36 pages. Price 2d.
No. 3—Africa - - - - - - - 32 pages. Price 2d.
No. 4—America - - - - - - - 36 pages. Price 2d.

*Specimens to Head Teachers on application.*

W. & R. CHAMBERS, Ltd.,
47 Paternoster Row, London; and Edinburgh.

# D. C. HEATH & CO.

BOSTON NEW YORK CHICAGO

BEG to intimate that, owing to the increasing demand for their educational publications, hitherto supplied in England by Messrs. ISBISTER & Co., LTD., they have established a London Office, and all future communications concerning their books should be addressed:—

D. C. HEATH & CO.,
15 York Street, Covent Garden,
LONDON, W.C.

HEATH'S MODERN LANGUAGE SERIES.
HEATH'S PEDAGOGICAL LIBRARY.
HEATH'S ENGLISH CLASSICS.
HEATH'S SCIENCE & OTHER TEXT-BOOKS.

☞ *Complete Catalogues now ready, and will be sent post free to any address.*

D. C. HEATH & CO., 15 York Street, Covent Garden, W.C.

## JOHNSTON'S NEW CENTURY GLOBE. 21s. net to Schools.

*Just Issued.*—An up-to-date 12-inch Terrestrial Globe, showing latest changes in South Africa and elsewhere. British Possessions coloured in red. The cover is printed in W. & A. K. Johnston's best style; it shows Ocean Currents, Isothermal Lines, and Date Line. The Globe has a strong metal Semi-Meridian, marked in Degrees; the Stand is of heavy metal, and gives designs of the Rose, Thistle, and Shamrock. THE BEST GLOBE FOR SCHOOLS.
*** *A Packing Case is included in the charge of 21s.*

New Editions. Just Published.

IMPERIAL SCHOOL WALL MAPS OF WORLD (Mercator) AND EUROPE.

Size, 72 by 63 inches. Price, on Cloth, Rollers, and Varnished, 21s. each, with Handbook.

OUTLINE ASTRONOMICAL, PHYSICAL, AND COMMERCIAL GEOGRAPHY.

REVISION NOTES for County Council and other Examinations. Crown 8vo, full-bound, cloth. Price 1s. 6d.

NEW OBJECT-LESSON PICTURES.

CUCKOO, TURKEY, FLY, FLOURMILLER, CONFECTIONER, IRONFOUNDER, BIRCH, MAHOGANY, CEDAR, and BARLEY. On Cloth, Rollers, and Varnished, 3s. 6d. each; or 30s. for a Selection of a Dozen Plates.

W. & A. K. JOHNSTON'S

EVERYDAY-LIFE SERIES OF CONVERSATIONAL LESSON PICTURES.

Text selected or written by Miss LUCY R. LATTER, late Assistant Superintendent of Method in Infants' Schools, under the School Board for London

The following are now ready:—POLICEMAN, BREAKFAST TABLE, STORY HOUR, SICK CHILDREN'S HOSPITAL, POSTMAN, WORKING MAN'S GARDEN, SHOEBLACK, COSTERMONGER, LAMPLIGHTER, MILKMAN.

The remaining Two, making Twelve in all, will follow immediately. Little Sketches illustrate the hand and finger play which accompanies the Rhyme for the children on each picture. Size of each, 35 by 28½ inches. Price 3s. 6d. each, on Cloth, Rollers, and Varnished.

*For full details of our Atlases, Wall Maps, Wall Illustrations, Object-Lesson Pictures, Terrestrial and Celestial Globes, etc., see our Catalogue, which is posted Gratis to any Address.*

W. & A. K. JOHNSTON, Ltd. (*Estab. 1826*),
*Geographical, Educational, and General Publishers,*
Edina Works, Easter Road, and 20 South Saint Andrew Street, EDINBURGH; 7 Paternoster Square, LONDON, E.C.

# OUR SCIENCE SECTION

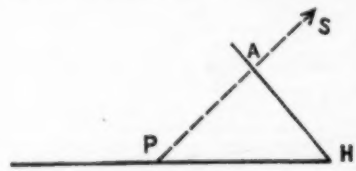
☞ **Subscribers requiring Explanations of Difficulties in any branch of Science, or Advice upon Courses of Study, can obtain all help required by communicating with the Editor, and accompanying their query with the Coupon cut from this Number.**

## PHYSIOGRAPHY.

### (ADVANCED AND HONOURS.)

**Sun-Pillar.**—Mr. Waugh reports as follows to the *Journal of the British Astronomical Association*:—"On the evening of Tuesday, June 25, a very vivid and beautiful sun-pillar was seen from Portland, Dorset. All the atmospheric conditions for this unusual phenomenon were favourable. Near the horizon there was a dense, dark mist, sufficient to prevent the actual setting of the sun from being seen. The sun's disc was a bright red, and the column of light which rose direct from the sun was a bright yellowish crimson. It rose from the horizon about forty degrees of arc, widening a little towards its highest portion. It was seen from about eight o'clock until nine o'clock, when it gradually faded away from its summit. The barometer stood at about 30·43 in., the thermometer at 70°, and the humidity at 74 per cent."

**Solar Altitude Instrument.**—The editor of the same journal gives the following interesting account of a simple bit of apparatus for determining the altitude of the sun:—"We have received from South Africa a description of a neat little instrument for finding the sun's altitude, and hence the time of day. The name of the inventor is not stated. It consists (1) of a bed-plate with three levelling screws, which must be levelled by a spirit-level; (2) of a thin flap hinged to this, with a small aperture in it. The line of hinges must be placed at right angles to the direction of the sun, and the flap turned till the distance of the spot of light (thrown by the sun through the aperture) from the line of hinges is a maximum. This may be quickly done by trial.




Let H be the hinge, A the aperture, P the spot of light. Then, clearly, HP is a maximum when PAH is a right angle. And $\frac{AH}{HP}$ = the sine of the sun's altitude. Since AH is of constant length, the distance HP measures the sun's altitude, and the base may be graduated in such a way as to give the altitude without any computation. The time may be found either by a single altitude (which requires the solution of a spherical triangle) or by taking equal altitudes in the forenoon and afternoon, local apparent noon being halfway between the two observations."

**Earthquake at Inverness.**—At 1.25 on the morning of Wednesday, September 18, Inverness experienced an earthquake shock, which was repeated at four o'clock. During the first disturbance a rumbling sound was heard, and so badly were buildings shaken that the windows rattled audibly, objects were thrown down, bells were set ringing, and a few chimney-pots fell over. The progress of the movement was apparently from north to south, and reports of the occurrence have been received from Avoch, Invergordon, Kildonan, Alness, Newtonmore, Pitlochry, Loch Ericht, and Aberdeen.

Mr. Davison, writing to *Nature*, says that such a severe shock has not been experienced for nearly a century. Scarcely a street in the city has escaped. From accounts that have appeared in the newspapers, and from a few that Mr. Davison has himself received, he draws roughly an isoseismal line corresponding to the degree seven of the Rossi Forel scale. It is in the form of an ellipse, with its longer axis parallel to the great northern boundary fault of the Highland district, and with the larger part of the curve lying on the south-east side of the fault. As the fault erodes in this direction, it is exceedingly probable that a slip along it at no great depth gave rise to the recent earthquake. A further shock was experienced on September 30.

**The Question of an Ultra-Neptunian Planet.**—In a paper read before the Royal Society of Edinburgh, Professor Forbes outlined the probable existence of a planet beyond Neptune. The chief factor on which the discussion was based is the proposition enunciated by Professor Newton in 1879, stating that "if the elliptic orbits of comets have been changed from parabolas by planetary perturbations, then the aphelion position of the new orbit will be most probably that occupied at the time of change." Professor Forbes in 1880 found that seven comets had aphelion distances about equal to a hundred times the mean distance of the earth from the sun.

The present note then deals more particularly with the recent discovery of a remarkable confirmation of these original results. The comet of 1556 (possibly identical with that of 1264) was not detected in 1848, and the computation is undertaken to show that the longitude of the new planet in 1696 was 112°, and its distance about a hundred times the earth's mean distance. The number of comets affected by these observed perturbances is so large that the new planet is probably greater than Jupiter.

A minute examination of all the comets in Galle's catalogue showed the author that no one of them represented the lost comet of 1556, and a further search has been made amongst those comets to which elliptic orbits have not as yet been assigned. Of these comets, 1844 iii. or 1843 ii. turn out to have aphelion longitudes near 115°. This position, he calculated, would be occupied by the hypothetical planet about 1705; and if the former comet (1844 iii.) should be the representative of the long-lost comet of 1556, the observed perturbations would all be as required by the theoretical deductions—namely, the node has retrograded considerably, the inclination greatly increased, and the longitude of perihelion advanced. The chief discrepancy is in the latitude of aphelion, which is smaller than would be expected. It thus appears that the long-lost comet of 1556 is represented by that of 1844 iii. perturbed by a planet considerably larger than Jupiter, situated at about a hundred times the mean distance of the earth from the sun, and whose longitude is about 181° in the present year, 1901. A re-examination of the 1556 observation is in progress, in the hope of finding more definite information.

**Analysis of Red Rain that Fell in Victoria, December 26, 1896.**—The deposit consisted of exceedingly small grains of various colours, many being flat or tubular, with irregular edges. It was very slightly, if at all, magnetic. When treated with hydrochloric acid it neither effervesced nor evolved chlorine. Analysis yielded the following numbers per cent.: water, 9·09; organic matter, 5·21. Soluble in HCl 8 (containing $Fe_2O_3$, $Al_2O_3$, $SiO_2$, $TiO_2$, CaO, MgO, $Na_2O$, $K_2O$, and traces of Na and Co 3·39). Insoluble in HCl 77·70 (containing $SiO_2$ 50·99, $Fe_2O_3$ and $Al_2O_3$ 16·40, CaO 0·21, $Na_2O$, $K_2O$, and traces of $Li_2O$ 10·10). Before the blowpipe, and in composition, the insoluble portion resembles felspar.

**Notanda for November.**—*Rainfall in November 1900.*—Rain fell on nine days. The total fall for the month was 3·72 inches, an amount in excess of the average for the fifty years 1841–90 by 1·45 inches.

*Length of the Day.*—On November 1 day breaks at 5 hours 1 minute morning, and ends at 6 hours 27 minutes afternoon, the day being thus 9 hours 38 minutes long.

**Mercury** ☿ is a morning star, and may be well observed on the 19th inst. in the south-east, its time of rising being two hours before sunrise.

# GREAT EDUCATIONAL INNOVATION

## Modern Languages on the Linguaphone!

In connection with our **Modern Language Publications,** which are now used in some of the largest *Colleges, Secondary Schools, Technical Schools, Higher-Grade Schools,* and *Commercial Schools,* and in order to popularise the *Phonographic method of learning Modern Languages,* which method we are the first publishers to introduce in this or any other country, we are placing within the reach of every one our new instrument, called **THE LINGUAPHONE, Regd.,** a new Phonograph, possessing a beautifully clear and loud tone. Whether it be used for learning a Language or for the lighter purposes to which Phonographs are usually put, such as for *Instrumental* and *Vocal* Music, it is equally satisfactory, and it is certainly the best machine yet invented. Its effects are superior to those of instruments of three times the price. It is easy to manipulate, it may be stopped or started at will, and will repeat as often as desired without the need of going to the end of the record. In fact, for the first time, the student has to hand at all times, and under his complete control, the very best means of training his ear to Foreign sounds.

## JUST THINK WHAT A BOON THIS IS!

**THE RECORDS.**—Our unique list comprises Records of all our Language Books, English and Foreign Songs, Recitations, Fables, Plays, etc., and a complete List of Instrumental Pieces, making the most complete Phonographic Catalogue published. The Records are the very best that can be obtained, and may be used hundreds of times without deterioration. Every record is tested, and a certificate given with each. Purchasers may select any pieces from our extensive lists.

**THE BOOKS** are acknowledged to be the best yet published for language purposes, being practical, complete, and thoroughly reliable linguistic guides, containing Descriptions, Conversations, Full Grammar and Exercises. Each book contains 30 Lessons, with 30 full-page numbered Illustrations.

**THE SYSTEM** has been tried and used for the past six months by Educational Celebrities, Editors, Commercial Men, Private Students, etc., and has given entire satisfaction. WHY? Because you have always at hand a willing teacher, thoroughly reliable, untiring, and inexpensive.

***A Great Combination—***

BEST BOOKS,
BEST RECORDS,
BEST INSTRUMENTS.

**FREE TO ALL.**

***Three Days' Free Trial.***

We will gladly send *absolutely free* to your address one of our Phonographic Outfits of any language or selected music or vocal records as per our lists of records on *trial for three days free.* If you are disappointed or dissatisfied, *send it back.* You *pay nothing until quite satisfied!!* **It costs you only a post card!**

**The Pictorial French Course.**
PAUL BARBIER. 2s. 6d.

**The Pictorial German Course.**
H. BAUMANN, M.A., F.C.P.

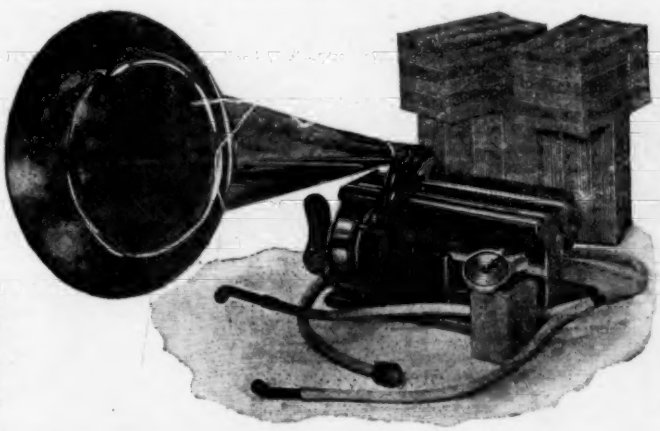
**The Pictorial Spanish Course.**
Same plan as above.

**The Pictorial Welsh Course.**
J. DAVIES BROWN, M.A.

**Barbier's Dictation Tests for Matric. and Inter. B.A.**

"I saw yesterday for the first time a copy of your Pictorial French Series. I regret very much I did not see it before we ordered our books, as it is undoubtedly the best book published in England or abroad, and I have taught French now for over 15 years."—W. REDFERN, Sept. 24th.

*Teachers' Aid.*—"This is certainly one of the simplest and most practical methods....*ever published.*"



*Schoolmaster,* 3rd August.—"The idea is admirable. The novelty lies in the fact that for each lesson a phonographic record has been made, so that by the aid of a phonograph a student may read and hear his lesson at one and the same time. This is putting the French master out of court with a vengeance. It is, at any rate, a tremendous advance on the usual plan of phonetic pronunciation in lesson books; and the private student who has no opportunity of securing a living voice to guide him, may yet live to bless his phonographic tutor."

*Freemason.*—"The lessons are eminently practical."

*H.M.I.*—"Most useful to the private student."

*The Catholic Fireside,* June 1901.—"'The Pictorial French Course.' This is a very up-to-date French Course indeed. The idea should take, as it seems to be capable of very practical developments."

MR. ERNEST WATTS, Queen's Road, Brighton, 10th Sept.—"I have tested your records, and think the system with the phonograph the finest way to learn that is known."

## DEFERRED PAYMENT SCHEME.

### *HUNDREDS OF TESTIMONIALS.*

For the convenience of purchasers, we offer them any of our Instruments and Outfits on *The Times* easy payment plan.

**OUR OFFER:—No. 1 Outfit,** consisting of Linguaphone No. 1, with 14-inch aluminium trumpet, ear-tubes, reproducer, book, and thirty records, either for language or music, or both at pleasure. Suitable for the private student or a small class. Loud and distinct. Price £4, 10s., delivered free. Pay 10s. within three days, and 10s. per month (only after you have tried it); or if you prefer to pay cash, send only £4. **No. 2 Outfit,** consisting of Linguaphone No. 2, in handsome polished case, with reproducer and recorder to make your own records. Strong motor, large 14-inch trumpet, ear-tubes. Complete with thirty Language or Music Records. Suitable for class teaching. Very loud and clear. Price £7, delivered free. Pay 14s. per month; or for cash, £6, 6s. Large machines, taking large records, can also be had on similar terms.

**EMPLOY YOUR WINTER EVENINGS PROFITABLY! LEARN A FOREIGN LANGUAGE! SEND FOR FREE TRIAL.**

*CATALOGUES* and every information per return. Catalogues of Records in English, French, German, Spanish, Italian, Welsh, Readings, Dictation Tests (Elementary and Advanced), Conversations, Recitations, Plays, Songs (Amusing and Sentimental), Instrumental Music, School Songs, Fables, etc., etc. Largest list in this country.

**Address—THE MODERN LANGUAGE PRESS, 49 FLEET STREET, LONDON, E.C.**

**Venus** ♀ is an evening star, setting nearly two hours after the sun low down in the south-west.

**Mars** ♂ is an evening star, low down in the south-west.

**Jupiter** ♃ and **Saturn** ♄ may be seen after sunset low down in the south-west.

**Constellations.**—At midnight on November 1, **Perseus**, **Aries**, and **Cetus** are on the meridian.

On the evenings preceding and following November 10 may be observed the nebula, 2½° to the east of γ Andromedæ, discovered by Miss Herschell. It is a very elongated nebula, 15 feet long by 3 feet broad, having a cleft dark in the middle that suggests the idea of a flat ring seen obliquely.

**The Leonids.**—About November 13 is expected the annual display of the meteoric swarm whose radiant is in the constellation Leo (to be recognised by drawing a line downwards from the Pole Star through the Pointers of the Plough); but during the past two years the display has been very inconspicuous, so that it is highly probable that the swarm has been dispersed.

# CHEMISTRY.

## (ADVANCED AND HONOURS.)

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),
*First Class Honoursman in Chemistry.*

**Treatment of Sulphide Ores.**—Sulphide ores cannot, as a rule, be reduced directly by carbon, but must undergo a preliminary roasting to remove the sulphur, the last traces of which are eliminated with extreme difficulty. Accordingly, when Mourlet directed attention some three years ago to the remarkable stability of calcium sulphide at electric furnace temperatures, the observation was sufficient to direct attention to the possibility of reducing sulphide ores directly by means of calcium carbide. Early in 1900 an account of investigations along this line was published by Geelmogden, who found that pyrite, tetrahedrite, galena, stibnite, and sulphide of magnesium were readily reduced by calcium carbide, the stable monosulphide of calcium remaining in the crucible, the metals of the ore being liberated, and, in the case of compounds of lead, antimony, and magnesium, volatilised. Aluminium sulphide alone proved capable of resisting the powerful reducing agent. M. Louis Michel Ballier, whose claims as original discoverer of crystalline calcium carbide have been recently upheld by the French courts, now describes an interesting extension of the foregoing principle, whereby the metals are recovered directly from mixed sulphide ores, and an efficiency of nearly 90 per cent. is obtained. If copper sulphide be fused in presence of a suitable flux, for which a blast-furnace slag, melting, according to the patent, at about 1500° C., is found available, and calcium carbide added in theoretical proportions, the reduction occurs readily, the calcium sulphide dissolving in the slag, and the copper being recovered as an ingot free from sulphur. If copper pyrites be subjected to the same treatment, it is found that the ingot obtained is composed of two sharply separated layers, of which the lower is copper and the upper iron, saturated with carbon. For ores containing zinc or other metal volatile at the temperatures used, a closed retort must be employed, and the vapours are condensed in the usual manner. The reduction of copper pyrites by this method requires an amount of 80 per cent. carbide, somewhat exceeding the amount of the ore. For copper sulphide, the carbide and ore are used in the ratio 1 : 2.

**Potassium Salts from Felspar.**—Mr. J. G. Rhodin of Manchester has discovered an economical method of manufacturing potassium salts from felspar. The felspar is first finely ground, and is then mixed with slaked lime and sodium chloride, the mixture being then heated to 900° C. By this means about 85 per cent. of the potassium in the felspar is extracted in the form of potassium chloride. It is stated that the process is both cheap and satisfactory, and efforts are being made to establish factories in Sweden, where felspar is exceedingly abundant. The insoluble residue remaining after the potassium and sodium salts have been extracted by water is, by the addition of a little alkali and sand, capable of being turned into a very good glass.

**Internal Friction of Solutions of Chrome Alum.**—In order to determine whether the change in colour from reddish violet to green, produced in chrome-alum solution by heating it, is accompanied by an alteration in the internal friction of the liquid, Signor Ferrero has measured the latter magnitude from two solutions containing respectively 20·3 and 13·75 per cent. of the alum. In each case the liquid was heated to a certain temperature, then cooled to 20·5°, and the measurement made at this temperature. The numbers show that the internal friction of chrome-alum solutions begins to undergo a gradual dissociation when heated to about 55°, a temperature corresponding approximately with the change in colour from violet to green; this diminution continues until the temperature reaches about 80°, above which the internal friction has a constant value. The difference between the values of the internal friction for the green and violet solutions diminishes with the concentration.

**Constitution of Water.**—Herr Hugo Witt works out more fully a theory previously advanced by De Coppet and by Röntgen as to the constitution of water. According to this theory, water consists mainly of double molecules $(H_2O)_2$ and more complex molecules $(H_2O)_n$, "ice molecules," whilst the number of simple molecules ($H_2O$) is small at low temperatures. By calculations based on Ramsay and Shield's association factor for water, the author finds that the most probable value for $n$ is 8. It is further shown that when a substance is dissolved in water the number of double molecules increases at the expense of the "ice molecules;" and on the supposition that the latter have the same specific volume as ice, the theory explains the contraction which accompanies solution. The theory also satisfactorily interprets the displacement of the temperature of maximum density in solutions, the small specific heat of aqueous solutions, the absorption of heat accompanying solution, the abnormal lowerings of the vapour pressure, and the excessive increase of isometric pressure with the contraction.

**New Method of Preparing FeO.**—It is generally stated that an amalgam of iron is unstable, and easily decomposes into mercury and iron. This is not correct, for the decomposition depends upon the conversion of the iron into ferrous oxide, and does not take place in a vacuum, nor in an atmosphere of an inert gas. The oxide formed was analysed, and an experiment was performed in which the increase in weight of a piece of amalgam containing 35·72 per cent. of iron was found in six days to correspond with the oxidation of 96·54 per cent. of the iron; the oxide takes fire at about 350°, and burns to magnetic oxide of iron ($Fe_3O_4$).

**Pure Barium Nitrite.**—A pure barium nitrite cannot be prepared from the commercial product which contains nitrate, as it is impossible to separate the nitrite and nitrate either by crystallisation from water or alcohol, or by fractional precipitation of the aqueous solution with alcohol. The usual methods of formation—namely, by heating barium nitrate, by saturating barium hydroxide with nitrous acid, and by reducing the nitrate with lead sponge—also yield an impure nitrate which cannot be purified. The pure nitrite is obtained by shaking silver nitrite, mixed with washed sand and water, with barium chloride, and evaporating the filtrate on the water bath. When the aqueous solution is crystallised at ordinary temperature over sulphuric acid, it has the composition $Ba(NO_2)_2H_2O$; when crystallised at a higher temperature, it contains rather less water. It is soluble in its own weight of water, gives a colourless solution which is neutral to litmus, and when dried is slightly decomposed with the formation of barium hydroxide. It melts at about 220°. Even after prolonged ignition decomposition is not complete, the mass still containing a small quantity of nitrite.

**Carbon Compounds.**—Under this head the Board of Education has set methane ($CH_4$), ethylene ($C_2H_4$), acetylene ($C_2H_2$), ethyl alcohol ($C_2H_5OH$), acetic acid ($CH_3CO_2H$), and coal gas to be studied. We shall give an outline study of these bodies in this column, as they are not found in the ordinary advanced stage text-books.

**Methane, Marsh Gas, or Fire Damp ($CH_4$).**—Best prepared by slaking lime with a solution of caustic potash, and then driving off the water by heating. A mixture of 100 grams of this soda lime with 30 grams of sodium acetate, when gently heated in a hand-glass flask or retort, yields a copious supply of methane, which is collected over water.

$$CH_3CO_2Na + NaHO = Na_2CO_3 + CH_4.$$

Three jars should be collected. In the first is poured some lime-water. A lighted taper is plunged in the second jar, and the products of the combustion of the methane are shaken up with lime-water. From this experiment we learn that methane is a combustible gas burning with a non-luminous flame, and that it contains carbon, since one of the products of its combustion is carbon dioxide. Over the mouth of the third jar is placed a similar jar containing nothing but air. After a time the upper jar is tested with a lighted taper, whereby it is demonstrated that methane is lighter than air. Next to hydrogen, it is the lightest body known. To get pure methane, methyl iodide ($CH_3I$) is run from a dropping funnel into a flask containing a zinc-copper couple (that is, granules of zinc that have been

# The Twentieth Century
# CITIZEN'S ATLAS

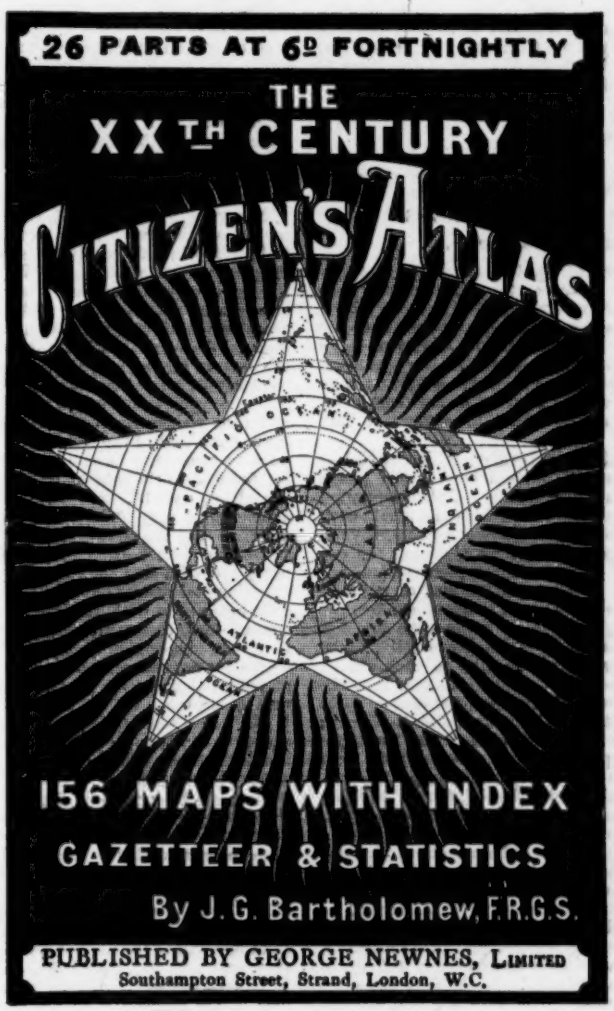
IS THE

= Latest =

= = Best = =

AND

Cheapest.




Send for SPECIMEN COPY of PART I.

PART I. ISSUED OCTOBER 1st

6d. EACH PART. Fortnightly.

AS A TEACHER you cannot afford to be without a good Atlas, and it must be thoroughly up-to-date in every respect. Consequently you must have the Twentieth Century Citizen's Atlas. All the Maps are from the latest surveys; the text is most interesting and instructive; the Index and Gazetteer are invaluable.

GEORGE NEWNES, Ltd., 7-12 Southampton Street, Strand, LONDON.

coated with copper by immersion in a dilute solution of copper sulphate, and which have been dried), covered over with a dilute solution of alcohol to which a few drops of $H_2SO_4$ have been added.

$$CH_3I + 2H = CH_4 + HI.$$

**Properties.**—Colourless, tasteless, inodorous gas. Burns with a pale flame to form $CO_2$ and water.

$$CH_4 + 2O_2 = CO_2 + 2H_2O.$$

Insoluble in water. Mixed with chlorine, in the dark there is no action. A mixture of two volumes Cl and one volume $CH_4$ explodes when exposed to direct sunlight, and carbon is deposited.

$$CH_4 + 2Cl_2 = C + 4HCl.$$

If the mixture is exposed to diffused sunlight, and not to direct sunlight, a mixture of four compounds—namely, (1) $CH_3Cl$ (methyl chloride), (2) $CH_2Cl_2$ (methylene chloride), (3) $CH_3Cl$ (chloroform), and (4) $CCl_4$ (carbon tetrachloride)—is produced; that is, the atoms of hydrogen are replaced by the substitution of one, two, three, and, lastly, four Cl atoms. It is this important substitution, and its bearing upon the composition of methane, that have to be carefully studied, understood, and remembered by the student.

# ELECTRICITY AND MAGNETISM.

## ADVANCED AND HONOURS STAGES.

BY EDWIN EDSER, A.R.C.S., F.PH.S.

In connection with the theory of electric currents, there is, perhaps, no point calling for more careful consideration than that of the seat of the electro-motive force of a cell. Rival theories have been propounded, and each can claim adherents of the highest distinction in science. As the merits of these theories have become sufficiently well recognised for questions to be set by the Board of Education in their examination in Electricity and Magnetism (Honours, Part I.), a short consideration of their salient points may be useful to readers of THE PRACTICAL TEACHER.

**The Volta Theory of Contact Difference of Potential.**—It is a well-established and uncontradicted fact that if pieces of zinc and copper are placed in contact in air, and then separated without being put in electrical connection with the earth, each will be electrified, the zinc positively, and the copper negatively. This result can be shown experimentally by replacing the cap of a gold-leaf electroscope by a plane disc of polished and unvarnished copper, and laying on this a plane disc of polished and unvarnished zinc. While the two discs are in contact, the leaves of the electroscope hang together; but when the zinc disc is removed by means of an insulating handle (care being taken that during removal the discs remain parallel to each other), the leaves of the electroscope diverge. This indicates that the discs are oppositely charged: when in contact, the lines of force extend in the narrow space between them, from zinc to copper; but on removing the zinc, the lines of force, entering the negative charge carried by the copper, take the shortest path from earth, between the case of the electroscope and the gold leaves. Although there is no dispute about the absolute trustworthiness of the above experimental result, very different theories have been propounded in order to explain it. The Volta theory assumes that different metals possess different attractions for electricity, *in virtue merely of their own chemical and physical properties*. According to those who uphold this theory (and the name of Lord Kelvin may be mentioned amongst its adherents), an essentially similar result would be obtained if discs of chemically pure zinc and copper were placed in contact, and then separated, in a perfect vacuum. Such a belief it is extremely difficult to either verify or disprove experimentally. In the first place, we cannot obtain a perfect vacuum. The very highest vacuum which has ever been obtained yet contains millions of gas molecules. Thus, the experiments of Bottomley, although they were performed in the best vacuum obtainable, and gave the same result as in air, must be received with great caution. Further than this, it is well known that all substances, including glass and metals generally, condense any gas or vapour in which they may be placed, so as to form a thin film over their surfaces. This film can only be removed by heating the substance to a high temperature in a vacuum. Spiers repeated Bottomley's experiments in a modified form, in which the experimental vessel inclosing the metals was filled with various gases, and then, after exhaustion, strongly heated. He found that the results obtained varied with the nature of the gas in the vessel before exhaustion. It had also previously been proved by Brown of Belfast that if the experiment described above were performed in an atmosphere of sulphureted hydrogen, the result differed from that obtained when it was performed in air.

It is sometimes stated that the zinc and copper, when placed together as above described, acquire different potentials, the zinc being ·75 volt higher than the copper. This is a distinct statement which can, I think, be definitely disproved. For, by definition, the assumed difference of potential is irreversible, always from zinc to copper; and according to the definition of potential difference explained in previous articles, if an electric current is sent from the copper to the zinc, in each second an amount of work will be performed by each unit of current which is numerically equal to the potential difference between zinc and copper. This work must be utilised either in continuously producing chemical change or in generating heat. Experiment shows that no progressive chemical change can be detected at the separating surface of the metals. Hence heat must be produced.

Now it is well known that heat is produced at a copper-zinc junction, when an electric current flows across it from copper to zinc. This production of heat has been termed the Peltier effect, from its discoverer. But the mechanical equivalent of the heat produced per second per unit current amounts only to a few thousandths of a volt, instead of from 0·75 to 1 volt. Hence it appears to be quite illogical, and contrary to the very definition of difference of potential, to say that there is a difference of potential of ·75 to 1 volt between zinc and copper when in contact.

Nevertheless it is a fact that the air near (but not within molecular distance of) the two metals acquires different potentials. But in this case we can explain the action in terms of incipient chemical change. We may put the case as follows:—Zinc and copper in air have a tendency to become oxidised. The strength of this tendency will be proportional to the heat of combination of each metal with oxygen. An actual film of oxide may not be formed, but a state of strain, due to the affinities of the metals for oxygen, is produced. If we suppose that, as in electrolysis, an oxygen atom carries a negative charge, then a film of oxygen clinging to a metal will give it a negative charge, and thus reduce its potential, the potential of the zinc being lower than that of the copper. On placing the metals in contact, positive electricity flows from the copper to the zinc, until both are reduced to the same potential. If the surfaces of the metals are plane, parallel, and very close together, they will form a condenser of very high capacity, and a very considerable charge will flow into the zinc. Thus, on removing the discs, the potential of the zinc rises and that of the copper falls, just as when the plates of a charged air-condenser are separated. Hence the experimental results quoted at the beginning of this article.

In connection with an electrolytic cell, adherents to the Volta contact-force theory say that the seat of the electro-motive force is at the zinc-copper junction. Reasons for disbelieving this statement have already been given. According to the definition of potential difference as the work performed per second per unit of current, we see that we must locate the seat of the E.M.F. of a cell in the liquid separating the electrodes, where energy is liberated or absorbed according as the chemical change produced there is one that would generate or absorb heat if it occurred outside the cell.

**Modern Theory of Voltaic Cell.**—Considerations regarding the elevation of the boiling point and the lowering of the vapour pressure and freezing point of water by dissolving acids and salts in it, have led to the conclusion that in dilute solutions these substances are dissociated into simpler elements, termed *ions* (see *Heat for Advanced Students*, by the Author, pp. 169, 191, 232). Thus, in a dilute aqueous solution of hydrochloric acid, the acid is dissociated into hydrogen and chlorine ions. In a Daniell cell there will be free ions of Zn and $SO_4$ in the zinc sulphate solution, and ions of Cu and $SO_4$ in the copper sulphate solution. It is assumed that both the zinc and copper electrodes project ions of the respective metals into the solutions in which they are placed. When the circuit of the cell is incomplete, a limit is soon reached as regards the number of metallic ions either electrode can project into the solution, since these ions are charged with positive electricity, and their loss would leave the electrode negatively electrified, so that they would be attracted by their respective electrodes. It is only possible for a certain number of metallic ions to exist in solution at the same time, so that if zinc and copper are connected together and dipped into a solution of copper sulphate, the metal which has the greatest tendency to diffuse into the solution (as we might put it) will continually produce more ions, whilst those of the other metal will be forced into the corresponding electrode. In the case considered, the zinc continually projects more ions into solution, whilst the copper ions are continually deposited on the cathode. Thus there is a continual passage of positive electricity through the solution from zinc to copper, the transference being effected by diffusion of the ions; whilst an electrical current passes from

## SCHOOL LANTERN SLIDES.

MESSRS. WILSON BROTHERS wish to obtain the co-operation of competent interested persons in arranging New Sets of Lantern Slides for School Purposes

The "Wilson" slides (trade mark, G.W.W.) are universally known among lanternists for their excellence, and it may therefore be relied on that the practical part will be properly carried out in any of the sets of slides that may be got up in result of CORRESPONDENCE AND SUGGESTIONS which are hereby CORDIALLY INVITED.

**LOCHHEAD HOUSE, ABERDEEN.**

## THOMAS MURBY'S
## POPULAR UP-TO-DATE TEXT-BOOKS

**Meldola's Inorganic Chemistry.** Metals and Non-Metals. With Chapters on Chemical and Spectrum Analysis, Chemical Laws, Deduction of Formulæ, and Modes of Chemical Action. By RAPHAEL MELDOLA, F.C.S. Revised by J. CASTELL-EVANS, F.I.C. (6th Ed.) Cloth, 2s.

**Castell-Evans' Experimental Chemistry,** including Qualitative and Quantitative Analysis. By JOHN CASTELL-EVANS, F.I.C., Technical College, Finsbury. (4th Ed.) 2s. 6d. With Key, 6s.; Key, 5s.

"Far in advance, from an educational point of view, of anything that has appeared as yet in this country."—*Journal of Education.*

**Skertchly's Geology.** (10th Ed.) Revised by JAMES MONCKMAN, D.Sc. Price 1s. 6d. cloth.

**Skertchly's Physical Geography.** (31st Ed.) Revised by J. H. HOWELL, B.A., Civil Service Department, King's College. 1s. cloth.

**Rutley's Mineralogy.** (12th Ed.) Containing a New Section on the recently adopted treatment of Crystal Symmetry, with Table of the 32 Symmetry Groups. 2s. cloth.

**Hobbs' Arithmetic of Electrical Measurements.** (7th Ed.) With numerous Examples fully worked. 1s. cloth.

**Analysis of English History.** (King Edward VII. Ed.) By W. C. PEARCE and Dr. HAGUE. Revised in accordance with the requirements of Modern Examiners by W. F. BAGUST, United Westminster Schools, with Eight Full-page Maps. 1s.; or with Biographical Appendix, 1s. 6d.

### Murby's "Charming" School Cantatas.

**Elsa; or, The Imprisoned Fairy.** 2s.
**Lost Dimplechin.** 2s.
**Shakespeare's Merry Meeting.** 2s.
**Queen I love you's Five o'clock Tea.** 2s. 6d.
**The Hobby Horse.** 1s.
**Up the Airy Mountain.** 6d.

"Mr. Murby's songs are quite worthy of the name classical. There is a wholesome and sound simplicity in them which charms not only children, but also those of a matured taste."—*Schoolmaster.*

"The music is good, being tuneful and simple without vulgarity."—*Athenæum.*

"Charming though simple music."—*Daily Telegraph.*

**London: 3 LUDGATE CIRCUS BUILDINGS, E.C.**

## DON'T LET YOUR MEMORY FAIL YOU!

**It may be the turning point of your career in life.**

**The Stiffest Exams. succumb easily after a course of**

# PELMAN'S SYSTEM OF MEMORY TRAINING

**And you may confidently look for the most lucrative results in attaining THE HIGHER EDUCATION. Its Logical Methods concentrate the Memory by the least mental effort.**

The Editor of *The Teachers' Aid* says:—"The School of Memory Training continues very popular with students, and is having *genuine success in helping examination candidates* and others afflicted with short memories. Those who have studied the system find it indispensable."

*The British Weekly* says:—"*Excellent work is being done by the School of Memory Training.* Pelman's system is in use among the higher educational institutions all over the Continent."

*The Pupil Teacher and Scholarship Student* says:—"The efficiency of the system is testified to by *medical doctors, editors, teachers, preachers, public speakers,* and, in fact, by representatives of all the professions.

**NOTE.**—*The PELMAN SYSTEM is taught by Correspondence as thoroughly as by oral tuition. PUPILS in the COLONIES have no difficulty in taking the course. The lessons are given in English, French, German, Italian, Russian, or Dutch, at the option of pupils.*

For Prospectus, Testimonials, and further particulars, address the Secretary,
**THE PELMAN SCHOOL OF MEMORY TRAINING, (Box 49), 70 Berners Street, London, W.**

***FREE.*** ***FREE.***

## PROFESSOR DENNEY
AND
## MR. LYDDON-ROBERTS,

***Principals of the Normal Correspondence College, have issued the following***

# FREE GUIDES.

1. **A.C.P.** - - - - - - 64 pages
2. **L.C.P.** - - - - - - 76 ,,
3. **F.C.P.** - - - - - - 80 ,,
4. **SCHOLARSHIP** - - 80 ,,
5. **CERTIFICATE** - - 40 ,,

"These guides are written by experts whose advice on the different points is the best procurable."—*Educational News.*

"No candidates should fail to obtain the guide to the examination he or she intends to take, as it will undoubtedly help greatly towards success."—*Schoolmistress.*

"The hints given are concise and practical, and the information quite up to date."—*School Guardian.*

These Guides are supplied gratis to all who state they intend sitting for examination.

Those applying for L.C.P. or F.C.P. Guide must give date of passing A.C.P. or L.C.P. Those applying for a Certificate Guide should state year of passing Scholarship, and number on the list.

**NORMAL CORR. COLLEGE,**
**47 Melford Road, East Dulwich, S.E., and 110 Avondale Square, London, S.E.**

copper to zinc through the external circuit of the cell. On the other hand, it is obvious that there will be a tendency for the $SO_4$ ions to collect near the copper, and these will diffuse through the liquid toward the zinc, carrying their negative charges. Of course there will be numerous recombinations between Zn and $SO_4$ ions, so as to keep the total number of metallic ions in solution at a constant value.

According to this view, the electro-motive force of a cell is due to the difference between the tendencies of the electrodes to diffuse into the solution, combined with the tendency of the ions to diffuse through the electrolyte owing to differences in their concentration.

# NOTES ON ADVANCED HYGIENE.

BY WALKER OVEREND, M.A., M.D. (OXON.), B.SC. (LONDON),

*Late Senior Physician to the Tottenham Hospital; Radcliffe Fellow, Scholar of Balliol College, and Exhibitioner in Comparative Anatomy of the London University.*

**Infectious Diseases, and their Prevention.**—(*a*) *Tuberculosis* is a general term which includes those diseases in which the bacillus tuberculosis plays the essential *rôle*. These minute bacilli appear, under the highest powers of the microscope, after appropriate staining, as delicate rods about one-fourth the length of a red blood-corpuscle. Some contain rounded bodies called *spores*. When the bacilli gain access to any organ, provided they find favourable conditions, they grow and multiply, forming small masses of a yellowish or grayish colour, called *tubercles*. Tubercles may be developed in any tissue; but the tissues of the lungs, peritoneum, and the coverings of the brain (*meninges*) are particularly prone to suffer. If the lungs are affected, the disease is termed *pulmonary phthisis*; if the peritoneum, it is called *tabes mesenterica*; if the meninges are attacked, it is *tubercular meningitis*. The latter two are found almost exclusively in children under five years of age.

Scrofula is an affection in which the lymphatic glands, especially those of the neck, become enlarged and congested. The interior becomes soft and cheesy, or breaks through the skin and discharges pus. Such glands usually contain the bacillus of tubercle, hence the disease is closely allied to phthisis; but, although the bacilli are identical, it appears that in scrofula they are not so virulent.

The tubercle bacillus may also attack the skin, and produce the disease termed *lupus*. The latter grows very slowly, but is exceedingly difficult to cure.

**Conditions which favour the incidence of Tuberculosis.**—One of the conditions inducing tuberculosis affects the constitution from birth, and that is *heredity*. But tubercle is *not* hereditary; the *predisposition* to tubercle may be, and often is, inherited. In children with such parentage, the tissues seem to possess a feebler resistance to the bacillus. But it has been shown that a tuberculous parent who nurses her offspring may actually and directly transmit the disease through the milk; in other words, the breast-milk may contain tubercle bacilli, and these are swallowed, and enter the stomach of the infant. As a rule, however, the mucous membrane of the stomach and intestines presents an impenetrable barrier; and it is only when the functions of the bowels are depressed, or when some alteration occurs in the composition of the fluids secreted into the bowels, that the bacilli are able to pass. Once having overcome this obstacle, they enter the lymphatics of the mesentery, and reach the lymphatic glands. Here they may be arrested and rendered innocuous; or, if the vital resistance of these glands be lowered, they may begin to grow, and possibly lead to fatal results.

Other conditions depress the general constitution during the course of life—for example: (1) air rendered impure through deficient ventilation, or from the fact that it has already been breathed once or more; (2) insufficient food; (3) want of exercise in pure air; (4) exposure to cold and wet; (5) living on damp soil.

**Prevention of Tuberculosis.**—1. Proper ventilation must be secured, especially for indoor or underground workers. Overcrowding must be prevented. Streets must be wide, with open spaces; no back-to-back houses permitted; and bedrooms must be amply supplied with air.

2. Sufficient exercise must be taken in the open air. Towns must be provided with parks and recreation grounds.

3. Damp soils must be efficiently drained.

4. Young adults who show a tendency to phthisis must select a calling in which there is as much out-of-door work as possible.

5. The meat and milk from cows affected with consumption must be avoided. Tuberculosis occurs among cows as a disease known as *grapes*. It also affects pigs and rabbits. The flesh is pale, moist, flabby, and lacking in fat. Freezing does not destroy the bacilli, but thorough boiling of the meat does so. The Royal Commission on Tuberculosis recommend that the entire carcass and organs be condemned when there is general tuberculosis of the lungs, and when tubercle is present in the pleura, peritoneum, and muscles. If the tubercle is confined to certain parts of the lungs, or to the liver, or certain lymphatic glands, they recommend destruction of these parts. On the other hand, they recommend the destruction of the whole carcass and organs of a pig if tubercle be found in any part.

Milk, as it comes from a healthy and clean cow, is a perfect fluid. But twenty-five per cent. of cows kept in town dairies suffer from tuberculosis. This is not surprising when one thinks of the overcrowding, dust and absence of ventilation in the sheds. Sometimes the udders suffer from tuberculous disease. It is said that the milk may contain tubercle bacilli even when the udders are healthy. In one hundred and eighty-six samples of milk from all sources, tubercle bacilli were present in eleven, and the organisms of pus in forty-seven cases.* Professor Koch has recently asserted that the tuberculosis of animals is different from that of man, and cannot be communicated from animals to man, for instance, by the drinking of infected milk. *A priori*, this seems ridiculous. We know that the mortality of children under five years of age from *tabes mesenterica* actually amounts to nearly three per thousand; and the question arises, How do these children acquire the disease if the milk is in all cases harmless? Several Commissions have been appointed—one in England, one in America, and another in Germany—to investigate the subject thoroughly.

It is the custom to deal with the germs in milk by means of sterilisation. This is effected by keeping the milk at boiling point (110° C.) for some time. Boiling, however, alters the taste of the milk, and destroys the fineness of the fat-emulsion; it coagulates some of the proteid, and renders the casein less digestible. To overcome these disadvantages, pasteurisation is employed. This consists in keeping the milk at a temperature of 70° C. (158° F.) for half an hour. By this means most of the germs are destroyed; but it is uncertain whether it really kills the tubercle bacillus. For ordinary purposes, actual boiling of the milk for a few minutes in a double saucepan is the most satisfactory. It should be rapidly cooled after removal from the fire, and strained.

(*b*) Consumptive patients themselves should really be treated as if they were suffering from a communicable and contagious complaint. The disease should be notifiable. The expectoration should be received into vessels containing formalin or ten per cent. carbolic acid. It should never be allowed to soil handkerchiefs or pass on to the floor, as when it dries it is wafted about by the air-currents of the room, and may thus be inhaled. Sufferers from these diseases should be isolated, especially if the sputum is copious. When a patient dies, the rooms should be thoroughly disinfected with formalin, in exactly the same manner as after scarlet fever and diphtheria.

(*c*) Children suffering from inflamed glands in the neck should be examined for discharge from the ears, or for a sore throat, or bad teeth, or eruptions on the head, and these sources of irritation should be remedied. Should the glands afterwards remain enlarged and inflamed, the general health must be improved by plenty of fresh air and exercise, and by nutritious food, including cod-liver oil and iron. Should they soften, it is better that they should be removed by the surgeon without delay.

## Books Recommended.

*Advanced Students.*

One of the following text-books may be recommended:—Whitelegge's *Hygiene and Public Health* (London: Cassell and Co., 7s. 6d.); Parkes and Kenwood's *Hygiene and Public Health* (London: H. K. Lewis, 10s. 6d.); or Wilson's *Handbook of Hygiene* (London: J. and A. Churchill, 12s. 6d.). Dr. Wilson's is the most comprehensive. Only the last editions of these books should be used.

*Honours Students*

should also consult for reference:—Kenwood's *Public Health and Laboratory Work* (London: H. K. Lewis, 10s. 6d.); Woodhead's *Bacteria and their Products* (London: W. Scott, 3s. 6d.); Newsholme's *Vital Statistics* (London: Swan Sonnenschein and Co., 1889, 7s. 6d.); Corfield's *Dwelling-Houses* (London: H. K. Lewis, 1894, 4s. 6d.); *The Theory and Practice of Hygiene*, by Notter and Firth (London: Churchill, 24s.).

* Eastes.

# APPROVED SCHOOL BOOKS.

## By Dr. CORNWELL, F.R.G.S.

*"We are qualified, by ample trial of the books in our own classes, to speak to their great efficiency and value. We have never known so much interest evinced, or so much progress made, as since we have employed these as our school books."—EDUCATIONAL TIMES.*

**A SCHOOL GEOGRAPHY.** 89th Edition. **3s. 6d.**; or with 30 Maps, **5s. 6d.**
"Very superior to the common run of such books. It contains a good deal of useful matter of a more practical kind than usual, which the exercises are likely to impress on the mind more deeply than by the parrot system."—*Athenæum.*

**A SCHOOL ATLAS.** Consisting of Thirty Small Maps. A Companion Atlas to the Author's "School Geography." **2s. 6d.**; or **4s.** coloured.

**GEOGRAPHY FOR BEGINNERS.** 68th Edition. **1s.**; or with 48 pages of Questions, **1s. 4d.** Questions, **6d.**
"A very useful series of educational works, of which Dr. Cornwell is either author or editor. It ('The Geography for Beginners') is an admirable introduction. There is a vast difficulty in writing a good elementary book, and Dr. Cornwell has shown himself possessed of that rare combination of faculties which is required for the task."—*John Bull.*

**SPELLING FOR BEGINNERS.** A Method of Teaching Reading and Spelling at the same time. 4th Edition. **1s.**

**THE SCIENCE OF ARITHMETIC.** A Systematic Course of Numerical Reasoning and Computations; with very numerous Exercises. By JAMES CORNWELL, Ph.D., and Sir JOSHUA G. FITCH, LL.D. 26th Edition. **4s. 6d.**
"The best work on arithmetic which has yet appeared. It is both scientific and practical in the best and fullest sense."—*London Quarterly.*

**KEY TO SCIENCE OF ARITHMETIC.** With the Method of Solution to every Question. **4s. 6d.**

**ALLEN & CORNWELL'S SCHOOL GRAMMAR.** 65th Edition. **2s.** red leather; or **1s. 9d.** cloth.
"The excellence of the grammar published by the late Dr. Allen and Dr. Cornwell makes us almost despair of witnessing any decided improvement in this department."—*Athenæum.*

**GRAMMAR FOR BEGINNERS.** An Introduction to Allen and Cornwell's "School Grammar." 88th Edition. **1s.** cloth; **9d.** sewed.
"This simple Introduction is as good a book as can be used."—*Spectator.*
☞ *The Book is enlarged by a Section on Word-building, with Exercises for Young Children.*

**THE YOUNG COMPOSER.** Progressive Exercises in English Composition. 48th Edition. **1s. 6d.** Key, **3s.**
"The plan of the work is very superior. We are persuaded this little book will be found valuable to the intelligent instructor."—*Westminster Review.*

**POETRY FOR BEGINNERS.** A Selection of Short and Easy Poems for Reading and Recitation. 13th Edition. **1s.**

**SCHOOL ARITHMETIC.** 18th Edition. **1s. 6d.** Key, **4s. 6d.**
"Eminently practical, well stored with examples of wider range and more varied character than are usually given in such books, and, its method of treatment being thoroughly *inductive*, it is pre-eminently the book for general use."—*English Journal of Education.*

**ARITHMETIC FOR BEGINNERS.** Combines simplicity and fullness in teaching the First Four Rules and Elementary Fractions. 9th Edition. **1s.**

London: SIMPKIN, MARSHALL, HAMILTON, KENT, & CO., LIMITED. Edinburgh: OLIVER & BOYD.

# MATRICULATION

## B.A. & B.Sc.

## EXAMINATIONS.

*(London University, Royal University.)*

### Preparation by Correspondence

On a Thoroughly Individual System, which ensures to each student the closest care and attention. Weak subjects receive special help. Fees may be based on success.

*Single Subjects may be taken* — Latin, Greek, French, German, Italian, Mathematics, Mechanics, Physics, Chemistry, Logic, Psychology, Political Economy, etc.

The Staff includes Graduates of London, Oxford, Cambridge, Dublin, and Royal Universities, Scholars, Honoursmen, and Prizemen.

***For terms, testimonials, etc., address:***

**Mr. J. CHARLESTON, B.A.**
*(Honours: Oxon. and London),*
**The Burlington Classes,**
**27 CHANCERY LANE, W.C.**

***Just ready. Extra cloth. Price 2s. 6d.***

## NELSON'S
# COMMERCIAL ARITHMETIC.

By GEORGE DENCH, B.A.,
*The Polytechnic Commercial School, Regent Street.*

**T. NELSON & SONS, 35 Paternoster Row, London, E.C.; Edinburgh; and New York.**

## . . THE . .
# FITZROY PICTURES.

***New Set for Schools.***

## THE MONTHS.

Designed by HEYWOOD SUMNER. In Colours, printed on stout paper. Lengthwise, 36 in. by 19 in. 10s. the Set of Four Prints, or 3s. each, net.

**Each Print illustrates Three Months.**

***Illustrated Prospectus post free on application.***

**London: GEORGE BELL & SONS, York Street, Covent Garden.**

***58th YEAR OF PUBLICATION.***

Reduced Fac-Simile of Cover.

## Wightman's Arithmetical Table Book.

**Revised to Date.**

*Embraces the principal Tables that should necessarily be acquired by the student in all grades. A remarkably compact and useful book.*

Crown 16mo, 64 pages.

**PRICE ONE PENNY.**

*Many Million copies of this valuable work have been sold.*

MAY BE HAD OF
**SIMPKIN, MARSHALL, HAMILTON, KENT & CO., LTD.,**
*Stationers' Hall Court and Paternoster Row;*
OF THE PRINCIPAL SCHOLASTIC AGENCIES,
AND OF THE PUBLISHERS,
**WIGHTMAN & CO., Ltd., Old Westminster Press, Regency St., S.W.; and 43 Essex Street, W.C., London.**

# THE EDITOR'S TABLE

GEORGE BELL AND SONS.

**English History during the Stuart Period (1603–1714).** Within the range of some two hundred and twenty pages the children of Standard VI. can here find an interesting and instructive course of lessons. The writer has brought out the character of England in those "golden days" in a truly charming manner. Special care has been taken with the biographies that abound in the book, while the concluding chapter, which covers thirty pages, on the "Social Life in the Time of the Stuarts," is well worth reading by old and young alike. The reader is taken right into the hearts and homes of the people, and is brought to see the condition of the masses of those times in a perfectly true light. The book contains fifty-one illustrations, and these, without exception, are splendidly chosen and instructive.

BLACKIE AND SON.

**English Classics: Marmion.** A handy little volume. The notes contain much useful information, and there is a map showing Marmion's route.

**Samuel Johnson—Wordsworth—Gray.** These are capital little manuals.

**A First German Book.** By L. A. Lowe. This is an easy German reader for young beginners in the language. It contains a good number of carefully prepared and graduated stories suitable for children of eleven and twelve years of age who have little or no previous knowledge of German. At the end of the book there is a vocabulary to each lesson, in addition to a separate and complete alphabetic vocabulary. The book is profusely illustrated, and the letterpress is in large, bold German character of the newest style. With such an excellent book in use, beginners are bound to make good progress.

CAMBRIDGE UNIVERSITY PRESS.

**An Outline History of the British Empire.** By W. H. Woodward. This is an abridged edition of the author's *Short History of the Expansion of the British Empire*, which was published a year or two ago—the making of the abridgment being doubtless a concession to the requirements of students who, preparing for examination, are at a loss for time to study matters in much detail. It had better be said that by British Empire is here intended the *Colonial* Empire of Great Britain, the origin and growth of which is lucidly and succinctly set forth in these pages. The period covered is 1500–1700; and of the twelve chapters of the book, the first six treat of the expansion of the empire generally, while the remaining half-dozen deal in turn with each of the great quarters of the world where British sovereignty has been established. There are some good maps to illustrate the stages of our colonial development, and two highly useful tables of all the chief events in our colonial history, and of our various possessions outside the limits of the United Kingdom. We can heartily recommend Mr. Woodward's sketch.

W. AND R. CHAMBERS, LIMITED.

**Preparatory History of England.** This book forms one of the "New Scheme" Readers. It covers the history of England from 55 B.C. to the present time, concluding with the accession of Edward the Seventh. The matter it contains, the way in which it is expressed, and the printing and general arrangement all betoken great care to set in the hands of young children a splendid course of lessons. The illustrations are worthy of special mention. They are exceedingly well chosen, and printed in excellent style. A useful summary is added at the end of the book.

J. AND A. CHURCHILL.

**Elementary Algebra.** By C. H. French, M.A., and G. Osborn, M.A. Pp. xvi + 448.

**First Year's Algebra.** By the same authors. Pp. viii + 172.

The first of these books is a second edition of the admirable Algebra which we have previously reviewed in these columns. It is nearly a hundred pages longer than its predecessor—an increase due almost entirely to the fact that the authors have added six new chapters (Indices, Ratio, Progressions, Theory of Quadratics, Remainder Theorem, Logarithms, etc.), so that the work now covers the ground of the London Matriculation, and is sufficient for the ordinary pass work of the Higher Certificate Examination and of the various local examinations. We rejoice to find that authors of books occasionally read reviews: this is unexpected balm to a reviewer's wounds. Most of the matters we quarrelled about—and they were neither many nor important—have now been attended to; and in regard to the matter of the former edition, "Othello's occupation's gone"—we have no fault to find. Our authors mercifully provide us, however, with an unusual quantity of new matter, and on this some criticism may be passed. The theorem on page 302 needs, for the average schoolboy, more careful safeguards than are generally provided. He is quite capable of arguing that if $4 + \sqrt{4} = x + \sqrt{x}$, $x$ is 4 because of the theorem; or even of wondering why, since $4 + \sqrt{4} = 5 + \sqrt{1}$, it does not follow that $4 = 5 = 1$. The proof that if A varies as B when C is constant, etc., fails to carry conviction to most schoolboys, because it assumes the variations of B and C separate, and it is not made clear that the same result will occur when they are simultaneous. A simpler proof is possible than the one given, which is the ordinary one of the text-books. Under geometrical progression we rejoice to find an elegant proof (due to Professor Hudson) that if $r$ is a fraction, the limit of $r^n$ is zero. The chapter on the remainder theorem is the least satisfactory in the book. Its title accurately describes it; it is essentially a chapter on remainder theorems, using the phrase in the sense assigned by drapery establishments, and consists of odds and ends which, presumably, the sad constraint of stereotype has collected here, since they could not be displayed on their proper counters. On page 361 the letter Q should not have been employed, for it does not mean the same thing as on page 360. The final chapter, on logarithms, also fails to reach the high level of those which have preceded. Difficulty is always found in the statement $10^{\infty\infty\cdots} = 2$, as to the meaning of an incommensurable index. The difficulty may be partly removed by the consideration of $10^{\infty\infty\cdots}$, to which an intelligible meaning can be given. Moreover, we think our authors mistaken in making no attempt to explain how the logarithms are determined. Professor Perry has shown how to construct a good four-figure table in a few hours by square roots only, and some hint at this might have been given. When all criticisms have been passed, however, the book remains a thoroughly sound treatment of the subject upon traditional lines, and may be cordially recommended.

The *First Year's Algebra* of the same authors is a reprint in cheaper form of the first 140 pages of the larger book. It includes easy fractions, simple equations and problems, and factors. Stereotype appears to be again responsible for the introduction here and there of a line or two which few teachers would care to include in a first year's course, but with this exception, the book may be unreservedly recommended.

W. AND A. K. JOHNSTON.

**Housefly and Bluebottle.** In view of the impetus given by the authorities to all nature-knowledge in our schools during recent years, a very creditable response has been made by the publishers to supply suitable pictures for illustration. In this chart the insects are represented in their natural colours, but so greatly magnified that the structure is visible to a large class. The proboscis, foot, and head are much enlarged to show interesting details, while a longitudinal section brings to light an anatomy which will doubtless surprise many a child. A set showing the life-history from egg to imago completes this very artistic group. The whole is on a blue ground, which renders it easy to see everything on the chart.

**Map of Part of the Dominion of Canada.** This map, which comprises Ontario, Quebec, Nova Scotia, New Brunswick, Prince Edward Island, and Manitoba, is designed chiefly for the public schools in Canada, and some details are shown which will necessarily have a local interest. But the map will be found exceedingly useful for schools on this side of the Atlantic. The Canadian lakes and the St. Lawrence are shown on an unusually large scale, well calculated to impress the mind strongly. The St. Lawrence Gulf, with the adjoining colonies, is beauti-

# Geometrical Design.

## The APPLICATION of . . GEOMETRICAL DRAWING to DECORATIVE WORK . and DESIGN.

BY

A DRAWING INSPECTOR.

40 pp., demy 4to. 2s.; net, 1s. 6d.; post free, 1s. 10d.

This book covers the new requirements of the Syllabus of the Art Examination of the Board of Education in Geometrical Drawing. It is illustrated with 156 Diagrams, and proceeds from the construction of Simple Elements to the working out of Elaborate Designs, and the Analysis of Designs already made. Many recent Examination Questions are completely worked out.

**E. J. ARNOLD & SON, LTD., LEEDS.**

A Course of Instruction in . . .

# Perspective

and the

## PROJECTION OF SHADOWS AND REFLECTIONS . . . .

By

**J. PETTY, ART MASTER;**

*Instructor to the Leeds School Board.*

114 pp., demy 4to. 3s. net; post free, 3s. 4d.

This book is written to meet the requirements of the NEW DRAWING SYLLABUS, in which Perspective is now made Compulsory.

It is an entirely NEW WORK, and is the only single book in the market which covers the New Syllabus. Its study will greatly simplify the work of Students who wish to pass the Examination of the Board of Education. There are nearly 100 Diagrams and fully-worked-out Examples, including numerous questions from Recent Examinations.

**E. J. ARNOLD & SON, LTD., LEEDS.**

A NEW BOOK OF OBJECT LESSONS.

## Graded . . Illustrated Model . .

# Object Lessons.

Containing Lessons from Common Objects, Animal Lessons, Plant Lessons, Mineral Lessons, Miscellaneous Lessons.

*Reprinted from* - -

**"The Girls' and Infants' Mistress,"**

And Kindergarten Review.

***PRICE, NET, 3s.***

## CHARLES & DIBLE,

LONDON— 10 Paternoster Sq., E.C. | GLASGOW— 155 St. Vincent Street.

DUBLIN—71 Middle Abbey Street.

## CODE BOOK-KEEPING, Etc.

**SARLL'S BOOK-KEEPING FOR NEW CODE.** Stage I. Introductory; II. Practical; III. Theory or Journalising. Each 48 pp. Price 4d. Outline Keys. MS. Books, 2d. each. *Schoolmaster* says:—"They are the *best and cheapest* manuals of the kind in the market."

**SARLL'S PRACTICAL BOOK-KEEPING.** Fourteenth and *greatly* improved Edition. *Teachers' Aid* says:—"There is no *cheaper* and *safer* guide." Consists of Grad. Exercises and Exam. Papers, with *full* or *outline* Keys. 128 pp. 1s. MS. Books, superior, 1s. Cheap, 4d.

**SARLL'S DOUBLE-ENTRY BOOK-KEEPING.** Fifteenth Edition. 2s. Complete with *full* or *outline* Keys. *Practical Teacher* says:—"We *heartily* recommend it as the *best* and *cheapest* manual we have seen." For Soc. of Arts Exams., Civil Service, &c. 256 pp. MS. Books, 1s. Cheap, 4d.

**SARLL'S TWENTIETH CENTURY EXAM. PAPERS IN BOOK-KEEPING.** Containing the *latest* papers by the *leading* Examining Boards, with notes and brief answers, in *two* parts, Sixpence each. Part I. Junior Papers, College of Preceptors, &c., ready *shortly*; Part II. Senior Papers, Society of Arts, &c., ready in *September* 1901.

**SARLL AND SOC. OF ARTS—NEARLY 1,600** Certificates and Two Bronze Medals. Results unsurpassed by any teacher in Great Britain.

*SUPPLEMENTARY KEYS. Now Ready.*

**I. TO SARLL'S PRACTICAL.** Containing fully-worked Keys to *all* the Exam. Papers in Practical at 1s., and to *all* the Exercises in Stages I. and II. at 4d. Two Shillings.

**II. TO SARLL'S DOUBLE-ENTRY.** Containing fully-worked Keys to *all* the Exam. Papers in "D Entry" at 2s., and to *all* the Exercises in Stage III. at 4d. Three Shillings.

*** Specimen Copies—except Keys—at one-third off, or Teachers can have Parcels for inspection, Post Free, from A. SARLL, A.K.C. (Lecturer, People's Palace, E., Polytechnic, W., &c.), 63 Oakley Road, London, N.

Twenty Lessons by Correspondence for 10s. 6d.

London: GEORGE GILL & SONS, 13 Warwick Lane, E.C.

CORRESPONDENCE COURSES FOR ALL DRAWING EXAMINATIONS.

## ARMSTRONG'S DRAWING SCHOOL,

23 The Avenue, Bedford Park, London, W.

Thorough guidance, and criticism of all drawings, by Mr. C. ARMSTRONG.

***New Number. Just Published.***

## ROYAL WALL ATLAS, No. 5—AMERICA.

***Teaching and Test Maps Combined.***

Eight Maps on one Roller, price 12s. 6d. the Set.

THOMAS NELSON AND SONS, London, Edinburgh, and New York.

fully set out. The map cannot fail to be welcomed by teachers. There is a handbook accompanying the map.

**Physical Map of the World (on Mercator's Projection), together with Handbook.** This map speaks for itself. It is set out on Mercator's projection, and is intended to show the main physical features of the world. It is not intended for study in detail, but to give good general notions. Short of an actual model, no better method has been devised for conveying the idea of varying height or depth than by means of shades of colour, and the map attains this end very effectively. The currents are carefully worked out.

Usually maps of the world are very cumbersome things, but this will be found very handy for class purposes.

The handbook accompanying the map is an excellent manual. The matter is arranged under two heads—"The Lithosphere" and "The Hydrosphere"—and is very interesting and instructive. Students and teachers will find it a mine of information. We think it would succeed admirably as a separate publication.

**Everyday Life Series of Conversational Lesson Pictures: "The Postman" and "The Working Man's Garden."** These are two beautifully-executed pictures, designed to aid the conversational lessons in the infant school. From an art point of view, they are well worth putting on the walls of any infant school, but they have also an important educational purpose. The subject-matter of each cartoon has been arranged by an expert, and with the aid of the picture, sundry hand movements very cleverly thought out, and easy and appropriate rhymes, the teacher endeavours, in Herbartian style, to develop in the children's minds some dominant idea. We can cordially recommend these pictures.

MACMILLAN AND CO.

**History of Europe in Outline (1814–1848).** By Oscar Browning, M.A. The appointment of this period for the study of candidates for Certificate in 1902 is the occasion which has called forth this excellent little handbook, but it will be read with interest and profit by numbers who have no occasion to prepare for the Certificate or any other examination. The preparation of such a work is one of great difficulty, not only on account of the large amount of knowledge required, and of research involved, but from the judgment required to bring together into one harmonious whole the histories of countries having apparently no other relation than that of time. Mr. Browning has overcome these difficulties with marked success, and has given us a book which justifies its claim to the title of "Outlines" by being free from discursiveness; and yet it is full of matter set out in a most interesting manner, and while apparently keeping to facts and avoiding generalisations and personal opinions, the writer enables us to trace for ourselves the course of the wave of political reaction which sought to make the Revolution excesses an argument for restoring those abuses which it had swept away. We only hope that this book may be followed by one or two similar volumes, bringing the history of Europe down to the present time.

**Practical Mathematics for Beginners.** By F. Castle. The vast amount of matter included under the head of Mathematics may be studied either as a mental discipline or for its practical use. To those who study it for the former reason, the chief thing is to arrange the course so that each part follows as a logical deduction from the preceding parts; no attempt is made to discover the practical utility of any particular part: but such is the nature of the subject that suggestions of practical applications thrust themselves upon the student at frequent intervals. The man, however, who studies mathematics because he wishes to apply it to other work is anxious to master those practical parts, with no more intervening theory than is necessary for the understanding of them. It is to meet the wants of the latter class of student that the book named above has been prepared. The writer assumes a knowledge of elementary arithmetic, but devotes three short chapters to contracted methods and approximations in decimals and evolution, and to the principles of proportion, which forms the basis of so much practical work. No doubt the writer felt great difficulty in deciding how much algebra to include, and how much to leave to the ordinary text-book, with which most of his readers are familiar; but he has included a short treatment of the subject, and given illustrations of its application to such matters as Ohm's law and the law of falling bodies, and stress and strain. Many students regard logarithms as a necessary evil, to be attended to before taking up the solution of triangles in their trigonometry; but the writer, in the lucid chapter treating of them, shows what a labour-saving instrument they may be made in all manner of mathematical work. The use of the common slide rule is then explained as a mechanical method of calculation based upon the division of the rule in logarithmic proportions. The use of squared paper, the plotting of curves and the methods of making calculations by means of them, are well treated in a section which should of itself establish a reputation for the book. We can cordially recommend the book, not only to those for whom it is intended, but to all teachers of mathematics who desire to make their lessons more real and interesting by introducing practical illustrations.

THOMAS NELSON AND SONS.

**Object Lessons in Geography and Elementary Science Combined.** By W. Done, B.A., and F. Tickner. Course D of the Code requires lessons in geography and elementary science combined. This combination is a very useful one for educational purposes. While directing the attention of children to the common phenomena of nature, some simple scientific explanation is generally necessary; for example, rain cannot be understood without some knowledge of evaporation and condensation.

This book contains notes for forty lessons, with list of apparatus needed, valuable teaching hints, summaries, and numerous diagrams. The latter being in white on a black ground, are more easily copied with chalk on the blackboard.

In all respects this handbook will be found most helpful, and we recommend it strongly to the notice of our readers.

GEORGE NEWNES, LIMITED.

**The Story of King Alfred.** By Sir Walter Besant. Although the lamented author of this book has for some weeks ceased to be amongst us, it is quite evident that it was written some time since March last, and is the outcome of his address at Winchester, as a preparatory step to the millenary function to take place there shortly. In the introduction Sir Walter Besant tells us that he wishes his story "to fall into the hands of school boards, continuation schools, and those who spend their evenings over books from the free libraries," to be used by them as a key to all that will be said and written about King Alfred during the next few months. The wish should be abundantly realised, because the ennobling, inspiriting way in which the history is written is just such as attracts the young for their benefit. Briefly told, the plan of the book is this: the authorities from which the narrative is derived are first given and discussed, then follows the genealogy of the hero king, with a vivid picture of England in the ninth century, in which his early days were lived; then come chapters telling of his life as a worker for religion, as a lawgiver, an educator, and a writer, followed by a summary of the reign, and closing with an account of his death. There is abundant food for thought all the way through, but the chapter on war may be taken perhaps to exemplify this statement. It is there pointed out that a king can only continue to lead bravely so long as he has brave followers, and therefore, indirectly, Alfred's life gives us insight into the character of his people, whom he represents a thousand years after they as individuals are forgotten. There is one thing, however, to which exception may be taken, and this occurs in the chapter on religion, where several existing sects are named as holding narrow tenets. Those who hold the same opinion as the author will perhaps the most strongly feel that a book meant for very general reading should avoid giving names in such cases.

Also we notice a little slip with reference to the antiquity of the Saxon church at Bradford-on-Avon. In the illustration on page 136, it is given as belonging to the seventh or eighth century; but later on, in the text of page 184, we read it may possibly be as early as the ninth century. (In Parker's *Gothic Architecture* the date is given very exactly as 705 A.D.)

The gifted author, however, has fulfilled his task in a way which will no doubt help to realise his aim, that English-speaking people everywhere should henceforth consider Alfred to be what he is—the typical man of our race, at his best and noblest.

---

We have pleasure in directing the attention of our readers to the announcement, on another page, of the Modern Language Press. The Modern Language Press are the originators of the system of supplying phonographic records for the purpose of learning languages, and also the publishers of a series of Pictorial French, German, Spanish, and Welsh Courses edited by language teachers of repute. A catalogue of the works, as well as a selected list of phonographs and accessories, are now issued, and may be had by any reader upon application to the Office of the Modern Language Press, 49 Fleet Street, London, E.C.

BRITISH MUSEUM 29 OC 1901

THE
**EDUCATIONAL MUSICAL INSTRUMENT CO.**

(ESTABLISHED 1881)

Is now supplying
***a Second Generation***
of Teachers with Musical Instruments.

For Lists and Designs apply to the
MANAGER,
43 Estate Buildings,
Huddersfield;
21 Argyle Crescent,
Portobello, Edinburgh;
or at 19 Highbury Place, London, N.

***The following will repay perusal:***

One of His Majesty's Inspectors of Schools writes:—"The Piano I had from you some eight years ago has proved to be a very good one, and is giving every satisfaction." (We have been favoured with orders from twenty members of the Inspectorate.)

**Our Instruments are in use**

A Teacher writes:—"You will be glad to know that the Piano I had of you some five years ago continues to give me every satisfaction. Its tone has been greatly admired, and it keeps in tune wonderfully well. It may interest you to know that a **Local Dealer's** price for **the same instrument was exactly £5 above yours.**" (We have *many thousands* of excellent testimonials from Teachers, etc. *See* our 94 and 90 pp. Books.)

**in EVERY County of Great Britain.**

A Clergyman writes:—"The Piano and Harmonium we had from you two years ago for our schools are still giving every satisfaction. Will you be good enough to send me prices of Pianos suitable for a Parochial Room?" (We have supplied some 1,300 Pianos, etc., for School use, and can offer **unapproached value at prices within the reach of all.**)

We pay carriage, give a month's **free trial, a ten years' warranty, and exchange free of cost** if the instrument sent is not all that is desired.

*N.B.*—All our Pianos are fitted with a special action to the **Soft Pedal that fully subdues the tone, and effectually preserves** the instruments during practice.

* See our 45 Guinea Upright Iron Grand for £21 Cash, or 36 payments of 14/3 per month.

Mr. J. H. Yoxall, M.P., writes:—"I enclose cheque in payment for Piano; the choice reflects the greatest credit on your firm. I am entirely satisfied with it in all respects, and I feel sure that a customer benefits very much by taking advantage of your experience and large connection."

Show Rooms open Daily. Call and see our Stock, or write for our List of **Instruments** for Home or School Use, specifying the class preferred, and you will find

**WE CAN SAVE YOU MANY POUNDS.**

(*Please mention this Paper.*)

THE MOST NUTRITIOUS.

# EPPS'S

GRATEFUL—COMFORTING.

# COCOA

BREAKFAST—SUPPER.

*NOW READY.*

**A NEW EDITION OF THE POPULAR**

## INTERLINEAR GERMAN READING BOOK.

**By F. HAHN.**

With the literal English translation on the Hamiltonian system.

Containing a selection of Tales by celebrated German authors, progressively arranged either for use in Classes or for Self-Study.

Edited, and Revised according to the new German Orthography, by C. A. Thimm, F.R.G.S.

8vo, paper wrapper, 1s.; bound in cloth boards, 1s. 6d.

"Simple moral tales written in an easy German style; the very best book for beginners."

E. MARLBOROUGH & CO., 51 Old Bailey, London, E.C.

**Keith Prowse & Co**

ESTABLISHED 100 YEARS.

NEW CENTURY
NEW MODEL

CASH £26

FREE DELIVERY

OR 30 MONTHLY INSTALMENTS OF 21/-

Come & See It
OR
WRITE FOR CATALOGUE
MENTIONING THIS PAPER
48 CHEAPSIDE LONDON.E.C.

. . CRAMER'S . .

## Educational Pianos.

**THE PORTABLE, Compass 5 Octaves, - 15 Guineas.**
In American Walnut and Mahogany.

**THE SCHOOL-ROOM PIANO, 7 Octaves, 24 Guineas.**
In Ebonised Case.

**THE COLLEGE MODEL IRON COTTAGE, 7 Oct., 38 Gns.**
In Rosewood, Walnut, and Ebonised.

*On Cramer's Three Years' System, or Liberal Discounts for Cash.*

**J. B. CRAMER & Co., Ltd.,**
207 and 209 Regent Street, W., and 46 Moorgate Street, E.C.
*Telephone 5012—"Gerrard."* *Telegrams—"Fortissimo," London.*

*Unquestioned Supremacy amongst Pencils is held by the*

**KOH-I-NOOR.**

L. & C. Hardtmuth's KOH-I-NOOR Pencils give the most entire satisfaction. The name Hardtmuth is a guarantee of excellence. The pencils do what is expected of them—sharpen to a fine point, do not snap off, and prove the most economical in use. The quality never varies. Made in 17 degrees, for all purposes! The best pencils for School and College use.

AWARDED GRAND PRIX AT PARIS, 1900.

# THOMAS NELSON & SONS, Publishers.

*All with beautiful Coloured Illustrations and in handsome Pictorial Covers.*

## Nelson's New Coloured Picture Books and Toy Books for Season 1902.

*UP-TO-DATE. ATTRACTIVE. WONDERFUL VALUE. Designed and Printed in Great Britain.*

**UP TO LONDON TO SEE THE KING.** Contains 14 pages of Coloured Pictures of the Sights and Amusements of London, and large Bird's-eye View of the City. With Cover, showing Portraits of the King and Queen. Price 1s.; or on linen, 2s.

**CHILDREN OF THE EMPIRE.** Contains 14 pages of Coloured Pictures, showing our Colonial Cousins in every corner of the World. Price 1s.; or on linen, 2s.

**A DAY AT THE ZOO.** Contains 14 large Coloured Pictures of Animals in the Zoo and others in their Wild State. Price 1s.; or on linen, 2s.

**PUSSY'S A B C.** An Alphabet Book of Large Letters and Large Pictures (in Full Colours) of Animal Pets. Price 1s.

**FOR THE FLAG.** The Flags and Soldiers of the Nations of the World, arranged to form a popular Painting Book. Price 1s.

**SAND CASTLES.** Contains 14 pages of Coloured Pictures of Children at Play on the Beach, and Picturesque Views of the Favourite Seaside Places. Price 1s.

**ALPHABET OF CHILDREN'S NAMES.** Contains 14 pages of Coloured Pictures of Children, with Names arranged to form a very pleasing A B C. Price 6d.

**ROMPS.** 12 Coloured Pictures of Merry Children at Play, indoors and out. With Attractive Letterpress. Price 6d.

**A DONKEY RIDE.** 6 Coloured Pictures of Animal Pets, with Letterpress and Monochrome Illustrations. Price 4d.

**FRIENDS FROM THE COUNTRY.** 6 Coloured Pictures, and Monochrome Illustrations and Letterpress. Price 4d.

**NURSERY JINGLES.** Some Favourite Nursery Rhymes, with 6 Coloured Pictures and Monochrome Illustrations. Price 4d.

**PUSSIES AND PETS.** 6 Coloured Pictures of Pleasing Animal Studies, with Letterpress and Monochrome Illustrations. 4d.

**A CHILD'S LIFE OF CHRIST.** Containing 64 pages of Illustrated Letterpress, with Coloured Frontispiece, Stiff Cover, turned-in edges, cloth back. Royal 4to. Price 1s.

**PUSS IN BOOTS,** and other Fairy Tales. With many Illustrations, Coloured Frontispiece, Stiff Cover, turned-in edges, cloth back. Price 1s.

**A CHILD'S LIFE OF CHRIST.** PART I. With Coloured Frontispiece and Stiff Fancy Cover. Full of Stories and Pictures. Royal 4to. Price 6d.

**A CHILD'S LIFE OF CHRIST.** PART II. With Coloured Frontispiece and Stiff Fancy Cover. Full of Stories and Pictures. Royal 4to. Price 6d.

**LITTLE RED RIDING HOOD,** and other Tales. ("Playtime Series.") With Coloured Frontispiece and Stiff Fancy Cover. Full of Stories and Pictures. Royal 4to. Price 6d.

**THE BABES IN THE WOOD,** and other Tales. ("Playtime Series.") With Coloured Frontispiece and Stiff Fancy Cover. Full of Stories and Pictures. Royal 4to. Price 6d.

A SELECTION FROM

## Messrs. Nelson's New Books for Prizes.

**** Complete List post free on application.*

**FOR THE COLOURS.** A Historical Sketch of the British Army. By HERBERT HAYENS, Author of "Ye Mariners of England," "Red, White, and Green," etc. With Coloured Frontispiece and 32 Illustrations by Archibald Webb and other well-known artists. Crown 8vo, bevelled boards, cloth extra, gilt top. Price 6s.

**IN FAIR GRANADA.** A New Historical Tale. By E. EVERETT-GREEN, Author of "After Worcester," "A Gordon Highlander," etc. With Coloured Illustrations by Walter Grieve. Crown 8vo, bevelled boards, cloth extra, gilt top. Price 5s.

**HELD TO RANSOM.** By F. B. FORESTER, Author of "The Spanish Cousin," "A Settler's Story," etc. Illustrated by Archibald Webb. Crown 8vo, bevelled boards, cloth extra, gilt top. Price 5s.

**JACK RALSTON.** A Tale of Life in the Far North-East of Canada. By HAMPDEN BURNHAM, M.A., Author of "Canadians in the Imperial Service." With Coloured Illustrations by Walter Grieve. Crown 8vo, bevelled boards, cloth extra, gilt top. Price 5s.

**FOR THE FAITH.** A Story of the Reformation Times in England. By E. EVERETT-GREEN, Author of "The Heir of Hascombe Hall," "French and English," etc. Illustrated by W. H. Margetson. Post 8vo, cloth extra. Price 3s. 6d.

**SCOUTING FOR BULLER.** A Story of the South African War. By HERBERT HAYENS, Author of "A Fighter in Green," "A Captain of Irregulars." With Coloured Illustrations. Post 8vo, cloth extra. Price 3s. 6d.

**THE CAPE AND ITS STORY; or, The Struggle for South Africa.** With Coloured Illustrations. Post 8vo, cloth extra. Price 2s. 6d.

**JIM'S SWEETHEARTS.** By E. L. HAVERFIELD, Author of "Rhoda," "Our Vow," etc. Illustrated by Miss Preston Macgoun. Post 8vo, cloth extra. Price 2s. 6d.

**ON HONOUR.** A Story of School and Home Life. By E. DAVENPORT ADAMS, Author of "A Girl of To-day," etc. With Coloured Illustrations by R. Farquhar. Post 8vo, cloth extra. Price 2s. 6d.

**MADAMSCOURT: or, The Adventures of a Fugitive Princess.** A New Story for Girls. By H. MAY POYNTER, Author of "A Merry Heart," "Scarlet Town," etc. Illustrated by R. Farquhar. Post 8vo, cloth extra. Price 2s.

**GREAT EXPLORERS.** An Account of Exploration and Travel in Many Lands. With 32 Full-page Illustrations. Post 8vo, cloth extra. Price 2s.

**TWO OF A TRADE.** A New Story for Girls. By the Author of "Val." Illustrated. Post 8vo, cloth extra. Price 1s. 6d.

**DICKIE.** A Story of Life in a Travelling Show. By Mrs. HAMILTON SYNGE, Author of "Glory," etc. Illustrated. Post 8vo, cloth extra. Price 1s. 6d.

**THREE SAILOR BOYS; or, Adrift in the Pacific.** The Adventures of Three Lads in an Open Boat, on a Coral Island, and among Cannibals. By VERNEY LOVETT CAMERON, C.B., D.C.L., Commander Royal Navy, Author of "Jack Hooper," etc. Illustrated. Post 8vo, cloth extra. Price 1s. 6d.

**THE STORY OF ALFRED AND HIS TIMES.** A Popular Life of Alfred the Great for Young People. By M. DOUGLAS, Author of "Breaking the Record," etc. Illustrated. Post 8vo, cloth extra. 1s. 6d.

**T. NELSON & SONS, 35 & 36 Paternoster Row, London, E.C.; Parkside, Edinburgh; and New York.**

# ENGLISH SCHOOL CLASSICS.

**With Copious Notes. Edited by THOMAS PAGE.**

Elegy in a Country Churchyard,
The Progress of Poesy,
The Bard,
Ode on a Distant Prospect,
Ode on the Spring, etc.
} In One Book, 4d.

The Traveller (Goldsmith). Price 3d.
Cowper: Expostulation. Price 4d.
Essay on Milton (Macaulay). Price 1s. 6d.
Paradise Lost. Book III. Price 1s.

## THE PLAYS OF SHAKESPEARE. EDITED BY T. PAGE.

*CONTENTS:*—Chief Events in the Life of Shakespeare—Shakespeare's Works—Introduction—Date and Early Editions—Source of the Plot—Sketch of the Plot—Sketches of the Principal Characters—Literary Notes—Notable Passages—Proverbial Expressions and Familiar Quotations—The Text—Miscellaneous Notes—Notes on the Language of the Play—Etymological Notes—Proper Names—Examples of Paraphrasing—Examples of Analysis of Sentences—Anachronisms—Typical Questions selected from various Examinations.

| | s. | d. | | s. | d. | | s. | d. |
|---|---|---|---|---|---|---|---|---|
| As You Like It ... ... ... | 2 | 0 | Julius Cæsar ... ... ... | 2 | 0 | Midsummer Night's Dream... | 2 | 0 |
| Coriolanus... ... ... ... | 2 | 6 | King John ... ... ... ... | 2 | 0 | Richard the Second ... ... | 1 | 6 |
| Hamlet ... ... ... ... | 2 | 6 | King Lear ... ... ... ... | 2 | 0 | Tempest ... ... ... ... | 2 | 0 |
| Henry V. ... ... ... ... | 2 | 6 | Merchant of Venice ... ... | 1 | 6 | Twelfth Night ... ... ... | 1 | 6 |

## MILTON.

*Practical Teacher.*—"Marked by those features of almost exhaustive annotation and complete classification of information on which we have commented in our notices of Shakespeare's plays, edited by the same practical hand."

| | s. | d. | | s. | d. |
|---|---|---|---|---|---|
| Samson Agonistes ... ... ... ... ... ... | 2 | 0 | Paradise Lost, Books I. and II. ... ... ... | 1 | 6 |
| Comus ... ... ... ... ... ... ... ... | 1 | 6 | Paradise Lost, Book III. ... ... ... ... | 1 | 0 |
| Lycidas, L'Allegro, and Il Penseroso ... ... | 1 | 4 | Shakespeare and Milton Reader ... ... ... | 1 | 4 |

***New and Enlarged Editions, now ready, of***

**MOFFATT'S**

## OUTLINES OF ENGLISH HISTORY

To Accession of King Edward VII. Price 1s.

**MOFFATT'S**

## OUTLINES OF GEOGRAPHY.

Revised to Sept. 1901, including last Census. Price 1s.

**MOFFATT & PAIGE, Ltd., 28 Warwick Lane, LONDON, E.C.**

---

# The American School and College Text-Book Agency.

## THE CARNEFIX CHART.

A Splendid Reading Chart in Colours. More than 100 beautifully Coloured Charts (37½ × 27½) firmly bound on a heavy roller. Easel supplied. **30s.**

## FRACTION CHARTS.

Three Charts (15 × 24) printed on heavy, substantial, linen-lined board, and beautifully Coloured. Set complete, **6s. 6d.**

***Just out (Copyrighted in Great Britain) a Beautiful New***

## FIRST READER.

Nothing to equal it—Print, Binding, and Illustrations (many of them Coloured). An ideal book for High-Class Kindergarten Schools. 143 pages (7 × 5½). Cloth, **1s. 3d.**

## "School Science,"

A Monthly Journal of Science Teaching in Secondary Schools.

"*School Science* is another indication of the great enthusiasm which characterises the educational life of the U.S."—*School World.*

**Single numbers, 1s. 3d. Annual Subscription, 10s. 6d.**

9 ARUNDEL STREET, STRAND, LONDON.

---

# T. NELSON & SONS, PUBLISHERS.

***JUST PUBLISHED.***

# Class Lessons in Domestic Economy.

By ETHEL R. LUSH,

*Late Head-Mistress of the Ipswich Higher-Grade Girls' School; Organising Mistress to the Ipswich School Board.*

Post 8vo, cloth boards, 232 pages, with numerous Illustrations.

***Price 2s. 6d.***

*** This volume contains lessons in Domestic Economy framed on the principles of object teaching. The aim of the Author has been to aid the teacher to teach the subject in a practical and interesting manner.

Experiments of a simple character have been introduced into the lessons, and numerous suggestive and appropriate illustrations are given in elucidation of the text.

It will be found of great value to teachers preparing for Scholarship and Certificate Examinations, while the lessons entirely cover the syllabus for the specific subject.

THOMAS NELSON AND SONS,

**35 & 36 Paternoster Row, London, E.C.; Parkside, Edinburgh; and New York.**

# BLACKIE AND SON'S

## New Illustrated Books for School Prizes, Rewards, etc.

### NEW AND REVISED EDITION OF POUCHET'S "UNIVERSE."

*By F. A. Pouchet.*

**The Universe;** or, The Infinitely Great and the Infinitely Little. By F. A. POUCHET, M.D. Revised and Edited by J. R. AINSWORTH DAVIS, M.A., Professor of Biology and Geology in University College, Aberystwyth. Illustrated by 269 Engravings on Wood and 7 Coloured Pictures. Medium 8vo, cloth elegant, gilt edges. 7s. 6d.

### By G. A. HENTY.

**With Roberts to Pretoria:** A Tale of the South African War. With 12 full-page Illustrations by William Rainey, R.I., and a Map. Cloth elegant. 6s.

**At the Point of the Bayonet:** A Tale of the Mahratta War. With 12 full-page Illustrations by Wal Paget, and 2 Maps. Cloth elegant. 6s.

**To Herat and Cabul:** A Story of the First Afghan War. With 8 full-page Illustrations by C. M. Sheldon, and Map. Cloth elegant. 5s.

*Mr. Henty's Previous Books.*

*Price* **6s.** *each.*

Won by the Sword.
A Roving Commission.
Under Wellington's Command.
Both Sides the Border.
With Frederick the Great.
With Moore at Corunna.
At Agincourt.
With Cochrane the Dauntless.
A Knight of the White Cross.
The Tiger of Mysore.
Wulf the Saxon.
St. Bartholomew's Eve.
Through the Sikh War.
Beric the Briton.
In Greek Waters.
The Dash for Khartoum.
Redskin and Cowboy.
By Right of Conquest.
By England's Aid.
With Lee in Virginia.

*Price* **6s.** *each.*

By Pike and Dyke.
The Lion of St. Mark.
Captain Bayley's Heir.
Bonnie Prince Charlie.
For the Temple.
The Young Carthaginian.
With Wolfe in Canada.
When London Burned.
The Lion of the North.
With Clive in India.
In Freedom's Cause.
Through the Fray.
Under Drake's Flag.
True to the Old Flag.
With Buller in Natal.
In the Irish Brigade.

*Price* **5s.** *each.*

No Surrender.
At Aboukir and Acre.
A March on London.
On the Irrawaddy.

*Price* **5s.** *each.*

Through Russian Snows.
In the Heart of the Rockies.
A Jacobite Exile.
Condemned as a Nihilist.
Held Fast for England.
Maori and Settler.
One of the 28th.
In the Reign of Terror.
Orange and Green.
Bravest of the Brave.
A Final Reckoning.
The Cat of Bubastes.
Dragon and the Raven.
St. George for England.
By Sheer Pluck.
Facing Death.
Out with Garibaldi.
For Name and Fame.

*Price* **3s. 6d.** *each.*

The Young Colonists.
A Chapter of Adventures.

*By Dr. Gordon Stables, R.N.*

**In Quest of the Giant Sloth.** With 6 full-page Illustrations by J. Finnemore, R.I. Cloth elegant. 3s. 6d.

*By Fred Smith.*

**The Boyhood of a Naturalist.** New Edition. With 6 page Illustrations. Crown 8vo, cloth. 3s. 6d.

*By Harry Collingwood.*

**The Pirate Island.** New Edition. With 6 page Illustrations. Crown 8vo, cloth. 3s.

*By S. Baring-Gould.*

**Grettir the Outlaw.** New Edition. With 6 page Illustrations. Crown 8vo, cloth. 3s.

*By Ethel F. Heddle.*

**An Original Girl.** With 8 full-page Illustrations by Gordon Browne. Cloth elegant. 6s.

*By Katharine Tynan.*

**A Girl of Galway.** With 8 full-page Illustrations by John H. Bacon. Cloth elegant. 6s.

*By Eliza F. Pollard.*

**The Doctor's Niece.** With 6 Illustrations by Sydney Cowell. Cloth elegant. 3s. 6d.

*By Bessie Marchant.*

**Three Girls on a Ranch:** A Story of New Mexico. With 4 page Illustrations. Cloth elegant. 2s. 6d.

*By J. M. Callwell.*

**A Little Irish Girl.** Illustrated by H. Copping. Cloth elegant. 2s. 6d.

*By Florence Coombe.*

**For the Old School.** Illustrated by Paul Hardy. Cloth extra. 2s.

*By Capt. F. S. Brereton, R.A.M.C.*

**The Dragon of Pekin:** A Story of the Boxer Revolt. With 8 full-page Illustrations by W. Rainey, R.I., and Map. Cloth elegant. 5s.

**A Gallant Grenadier:** A Story of the Crimean War. With 8 full-page Illustrations by Wal Paget, and Map. Cloth elegant. 5s.

*By John Samson.*

**In the Dictator's Grip:** A Story of Adventure in the Pampas and Paraguay. With 6 page Illustrations by Paul Hardy. Cloth elegant. 3s. 6d.

*By Fred Smith.*

**The World of Animal Life.** Edited by FRED SMITH. Profusely illustrated with Engravings after F. Specht and other eminent artists. Cloth elegant. 5s.

*By Charles Squire.*

**The Great Khan's Treasure:** A Story of Adventure in Chinese Tartary. With 6 full-page Illustrations by Monro S. Orr. Cloth elegant. 3s. 6d.

*By E. Harcourt Burrage.*

**Carbineer and Scout:** A Story of the Boer War. With 4 page Illustrations. Cloth elegant. 2s. 6d.

*By H. Elrington.*

**In the Days of Prince Hal;** or, The Little Forester. Illustrated by Arthur Garratt. Cloth extra. 1s. 6d.

*By Ellinor Davenport Adams.*

**Those Twins!** With a Frontispiece and 28 Illustrations by S. B. Pearce. Cloth elegant. 2s. 6d.

*By Jennie Chappell.*

**Terrie's Travels;** or, The Adventures of a Small Boy. With 21 Illustrations by S. B. Pearce. Cloth extra. 2s.

*By Skelton Kuppord.*

**Hammond's Hard Lines.** By SKELTON KUPPORD. New Edition. Illustrated by Harold Copping. Crown 8vo, cloth. 1s. 6d.

*By Jennett Humphreys.*

**Laugh and Learn:** Nursery Lessons and Nursery Games. By JENNETT HUMPHREYS. New Edition. With 4 coloured and many black-and-white Illustrations. Square 8vo, cloth elegant. 2s. 6d.

## BLACKIE'S GRADUATED STORY BOOKS.

SIMPLE STORIES BY THE BEST AUTHORS.

*New Volumes of the Shilling Series.*

**Bears and Dacoits.** By G. A. HENTY. New Edition.

**Crusoes of the Frozen North.** By Dr. GORDON STABLES.

**A Saxon Maid.** By ELIZA F. POLLARD.

**Uncle Bob.** By MEREDITH FLETCHER.

*New Volumes of the Ninepenny Series.*

**Cherrythorpe Fair.** By MABEL MACKNESS.

**Little Greycoat.** By ELLINOR DAVENPORT ADAMS.

**Tommy's Trek.** By BESSIE MARCHANT.

*New Volumes of the Sixpenny Series.*

**Two Little Crusoes.** By A. B. ROMNEY.

**The Lost Doll.** By JENNIE CHAPPELL.

**Bunny and Furry.** By GERALDINE MOCKLER.

## BLACKIE'S NEW PICTURE BOOKS.

*By Charles Robinson—Walter Jerrold.*

**Nonsense, Nonsense.** With 28 pages in full colour, 36 pages in two colours, cover design and end papers, by CHARLES ROBINSON. Verses by WALTER JERROLD. Picture boards, 10½ inches by 8½ inches, cloth back. 6s.

*By H. B. Neilson.*

**An Animal A B C.** With 24 pages in two colours, and 26 pages in black-and-white. Picture boards, cloth back. 2s. 6d.

*By Stewart Orr—John Brymer.*

**Gammon and Spinach:** Pictures by STEWART ORR, Verses by JOHN BRYMER. Cover design and 24 pages in full colour. Picture boards, cloth back. 6s.

*By Fred Smith.*

**The Animal Book:** A Natural History for Little Folk. With a Coloured Frontispiece and 24 full-page Illustrations by F. Specht. Crown 4to, 11½ inches by 9½ inches, picture boards, cloth back. 2s. 6d.

## New Children's Picture Books at 2s.

**Faithful Friends.**

**My Book of Nursery Stories.**

**My Very Own Picture Book.** New Edition.

**Cosy Corner Stories.** New Edition.

**My Very Best Book.** New Edition.

**Armchair Stories.** New Edition.

**Our Darling's First Book.** New Edition. Each book, handsomely bound in cloth, with gilt edges, contains over 20 full-page Drawings by eminent artists, and a large number of smaller Illustrations, while no fewer than Twenty Pages (including Three Double Pages, 14 inches by 8½ inches) are in colour.

*Also a large selection of Picture Books at prices ranging from 1s. 6d. to 3d.*

Blackie and Son's New Illustrated Catalogue of Books suitable for Presentation, School Prizes, Rewards, etc., sent post free on application.

**LONDON: BLACKIE AND SON, LIMITED, 50 OLD BAILEY.**



BRITISH MUSEUM
29 OC 1901



COUPON
PRACTICAL TEACHER
November 1901.



PRINTED AND PUBLISHED BY THOMAS NELSON & SONS, PROPRIETORS, AT THE OFFICE OF "THE PRACTICAL TEACHER," 35 & 36 PATERNOSTER ROW, LONDON, E.C.